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KOBON PHONOLOGY

by

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ABBREVIATIONS AND SYMBOLS

adv.	-	adverb
C	-	consonant
Fig.	-	figure
imp.	-	imperative
SIL	-	Summer Institute of Linguistics
sp.	-	species
V	-	vowel
vd.	-	voiced
vl.	-	voiceless

Phonetic and phonemic transcriptions are in the International Phonetic Alphabet with the following exceptions:

!	-	retroflexed flapped lateral
ʋ	-	voiced labiodental semivowel
[tc], /c/	-	voiceless alveopalatal affricate
[dz], /j/	-	voiced alveopalatal affricate
h	-	pharyngeal fricative
ɾ	-	flapped vibrant
y	-	palatal semivowel
ʍ	-	voiceless bilabial semivowel
s	-	voiceless alveolar grooved fricative
ɩ	-	lowered and retracted high close front unrounded vocoid
ʊ	-	lowered and advanced high close back rounded vocoid
ʌ	-	mid open central spread vocoid
‿	-	voicelessness of consonants
ˌ	-	palatisation of preceding consonant

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1. INTRODUCTION

1.1. *LOCATION*

The Kobon language is spoken in the Bismarch-Schrader Ranges on the border of the Madang and Western Highland Provinces of Papua New Guinea. Most of the 4,000 Kobon live in the Kaironk Valley, which nestles between the Bismarck and Schrader Ranges. The Kobon name for the Kaironk River is **Waḷü** ['waḷɨ]. Eastwards from Ainonk and Womok, the Kaironk Valley is inhabited by Kalam and westwards to its point of union with the Jimi River by Kobon. Population is most dense in the Upper Kaironk and becomes progressively less dense as one goes westwards and then southwards toward the Jimi. Kobons also inhabit the Sal, Knej, Gulo, Wulamur (Kobon [u'ḷamɨḷ]), and Singapi (Kobon [haŋ'gaβi]) Valleys. The area to the west of Singapi is inhabited by Wiap speakers. See Maps 1-3.

1.2. *EXTERNAL RELATIONSHIPS OF KOBON*

Wurm (1971:548, 551) includes Kobon in the Kalam (Karam) language family of the East New Guinea Highlands Stock.[1] Kobon's closest linguistic relative is Kalam. Kobon and Kalam are mutually unintelligible. They share only about fifty percent of basic vocabulary, though they are very similar structurally.

There has been considerable contact between the Kobon and their Kalam neighbours to the east, and somewhat less with their Wiap neighbours to the west, notably a periodic assembling for ceremonial and festive purposes (Kobon [Φarʌm]). It is often at these periodic assemblies that spouses are chosen. Kobon intermarry with both the

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[1] Wurm (1961, 1962) had earlier classified Kalam as related to but not a member of the East New Guinea Highland Stock. Pawley (1966:167) makes a typological comparison of Kalam and the East New Guinea Highland Stock languages. He shows how the suffixes of proto-Eastern East Central exhibit detailed similarity to the major allomorphs of the subject-marking suffixes in Kalam and Kobon. On this and other typological grounds he argues that Kalam should be included in the Stock.

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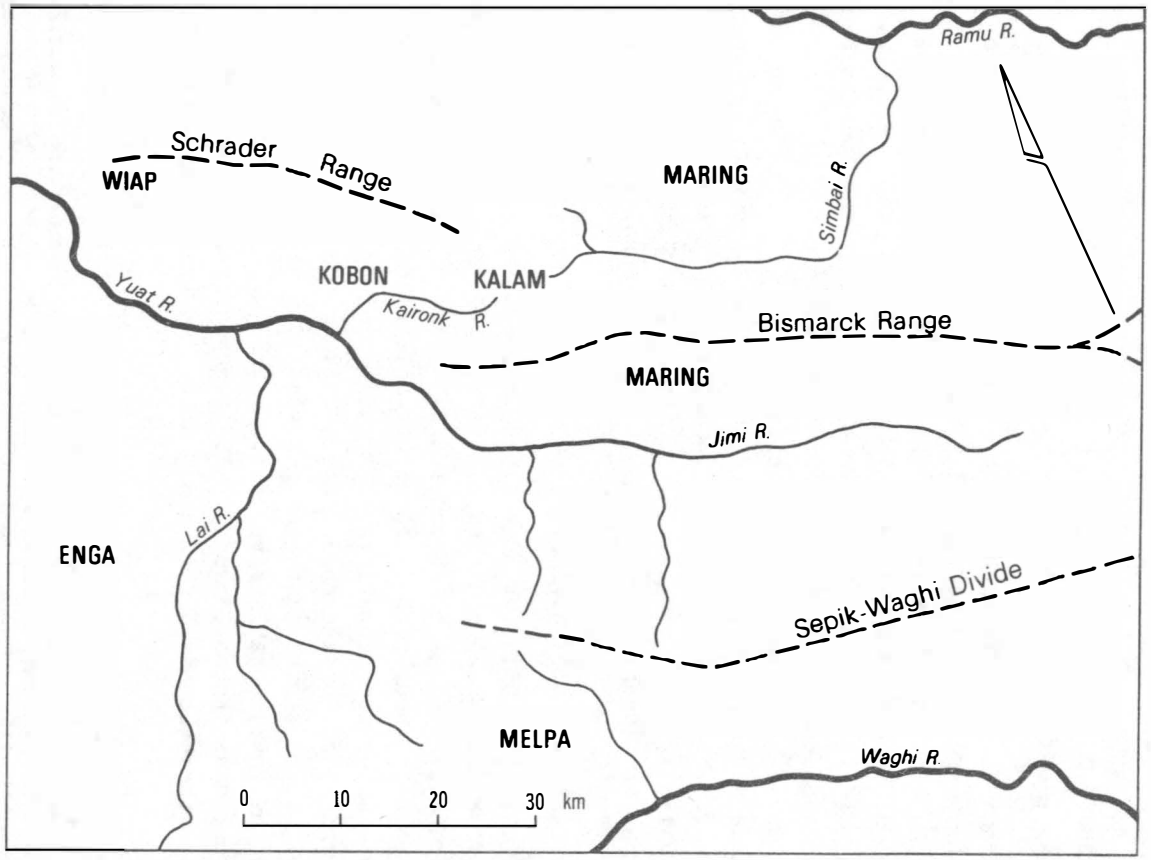
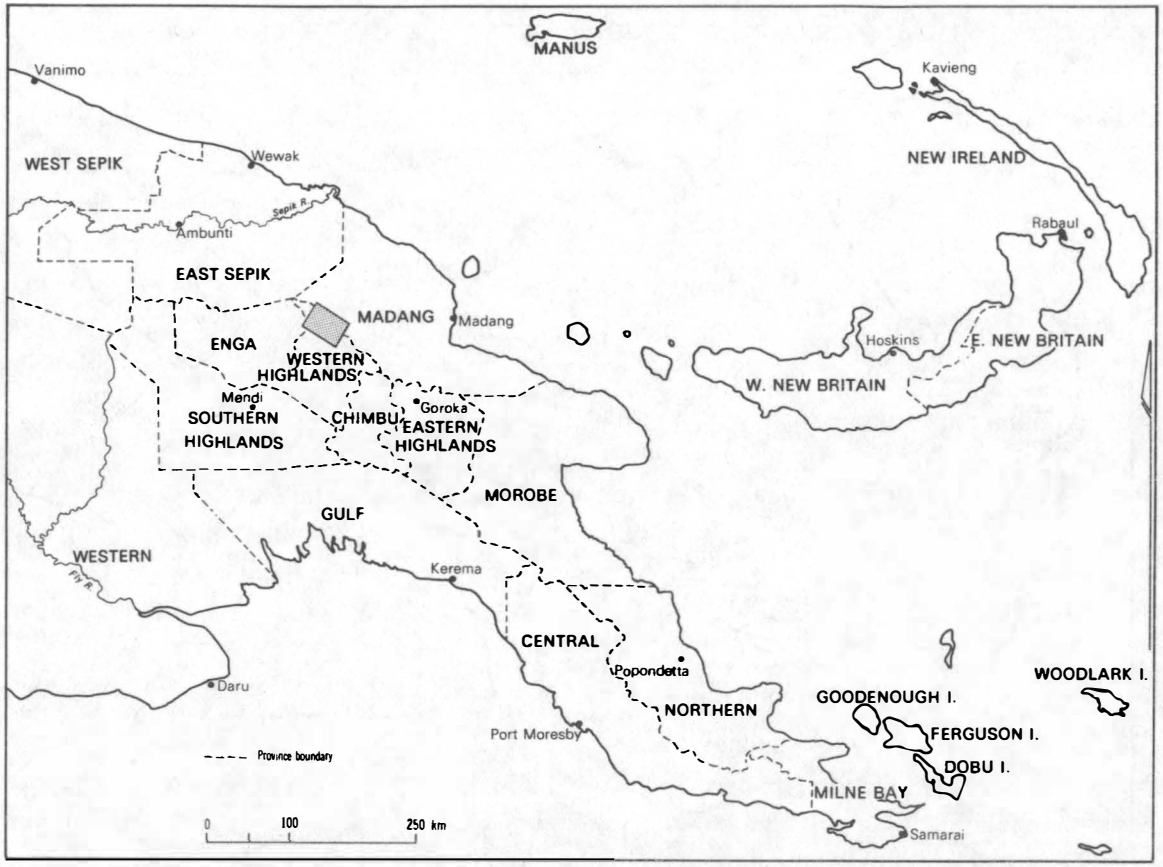
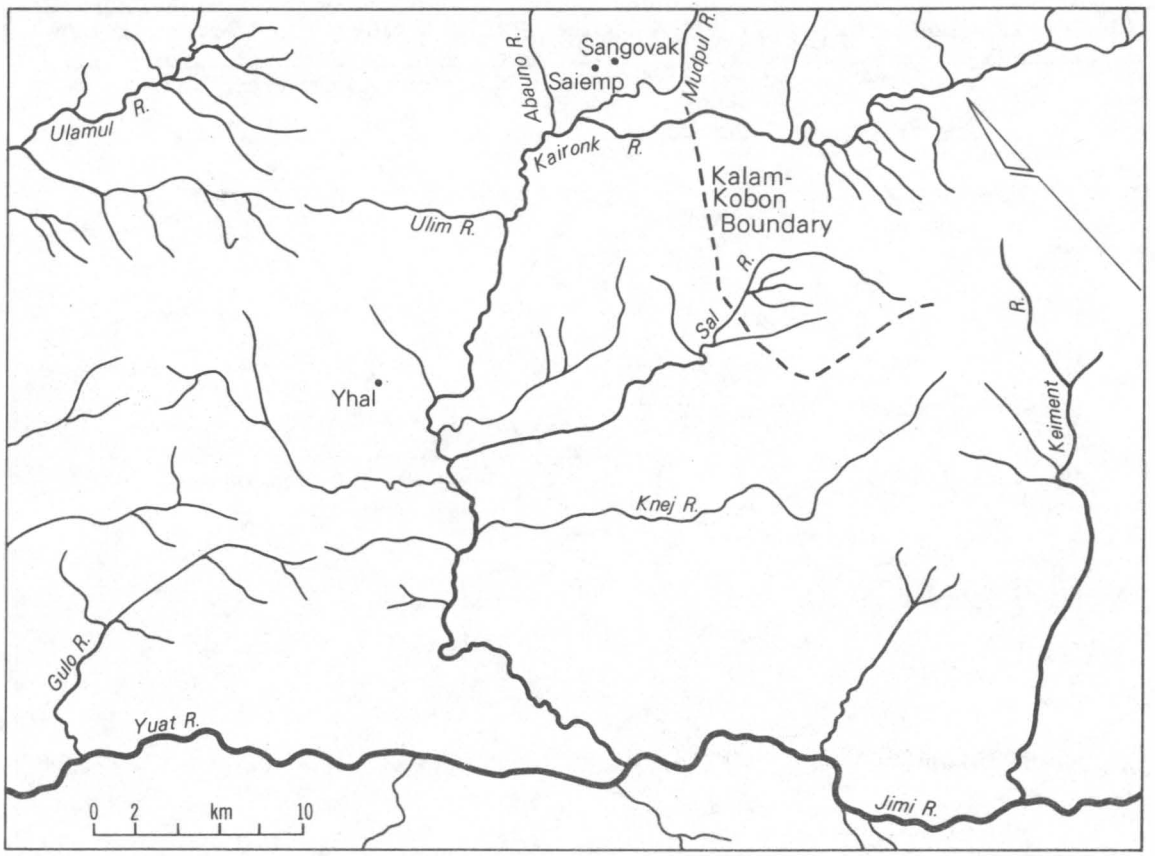


MAP 1: GEOGRAPHICAL LOCATION OF THE KOBON (BASED ON JACKSON 1975)



MAP 2: PAPUA NEW GUINEA (THE SHADED AREA IS THAT COVERED BY MAP 1)



MAP 3: THE KAIRONK VALLEY (BASED ON JACKSON 1975)

Kalam and Wiap and many Kobon living around Ainonk and Womok and in the Upper Sal valley have native fluency in both Kobon and Kalam. The basic relationship has, however, been one of mistrust and fear.

1.3. *KOBON ECOLOGY AND SOCIAL ORGANISATION*

In common with their Kalam-speaking neighbours, the Kobon are of short stature. The basis of their economy is gardening, though hunting and gathering are also important. Their staple subsistence crops are sweet potato and taro. Other foods grown are yams, pueraria, bananas, edible pitpits, beans, gourds, tapioca, cultivated greens, cucumbers, pumpkins, and corn. Pigs and dogs are domesticated.

The Kobon live in scattered homesteads, each homestead being occupied by a family or, more usually, an extended family of a man, his wife or wives and children, his brothers and their wives and children, and maybe his parents.

1.4. *FIELD WORK*

The dialect of Kobon considered in this study is that spoken at Salemp (Kobon [ˈɻ̲alempʰ]) and Sangovak (Kobon [ˈhaŋgoβa]). This study is based upon some 4,000 utterances, some spoken in context, some elicited. About twenty months were spent in the field gathering the data. Kobon language assistants have been Jepi, Ugai, Lipgi, and Urumungu, all in their late teens. Apart from Urumungu, who spent two years at a plantation near Rabaul, they had not traveled outside their own language area, except for an occasional visit to Simbai. All spoke a little New Guinea Pidgin (N.G.P.) (Tok Pisin).

2. THE MODEL

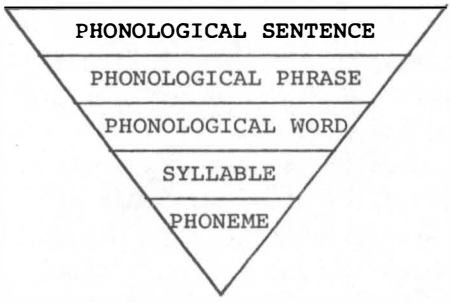
The model which has been used for the analysis presented in this study is that of Kenneth L. Pike. One of the goals of this phonological analysis was the production of the most adequate writing system for Kobon. The suggested writing system is described in Section 4. Pike (1947b: Chapters 5-13) gives a set of analytical procedures whereby the phonology of a language may be analysed and a system of writing devised. Pike assumes that "phonemic procedures are based upon universal language characteristics". If this is so (and I think it is), then it should be possible to produce a phonological analysis of any language by following his analytical procedures. In fact they have been followed in the analysis of some six hundred of the world's languages, and also in the analysis which is presented in this paper. A brief summary will outline the theoretical orientation of this approach.

The procedures include the listing of suspicious pairs of sounds and the listing of nonsuspicious sounds; separating of segments which contrast in identical or analogous environments; uniting similar segments which are found in mutually exclusive environments, or which are found freely fluctuating but never in contrast; the use of clues afforded by the tendency of sound systems towards phonetic symmetry; the phonemic interpretation of suspicious segment types and segment sequences; analysis of pitch; border phenomena.

Pike views the phonological component of a language as a hierarchy. This hierarchical approach is reflected in the analysis of Kobon presented in Section 3. However, it is a segmental analysis and remarks about higher levels are tentative. A thorough analysis of these levels yet remains to be done. Each unit functions within the unit on the next higher level so that the phoneme functions within the syllable, which in turn functions within the phonological word, which in turn functions within the phonological phrase, which in turn functions within the phonological sentence and so through the hierarchy.[1] As for the structure of the phonological units, each unit consists of a unit or units from the next lower level, so that a phonological sentence consists of one or more phonological phrases, a phonological phrase consists of one or more phonological words, a phonological word consists of one or more syllables and a syllable consists of one or more phonemes. The function of units in the unit of the next higher level and the structure of a unit from units of the next lower level is represented diagrammatically in Figure 1.

FIGURE 1

THE PHONOLOGICAL HIERARCHY



Pike's procedures for phonemic analysis are built around four basic premises (1947b:58-60).

"First premise: Sounds tend to be modified by their environments."

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[1] Eunice V. Pike (1974) provides analytical procedures for a distribution based definition of these higher levels and Marvin K. Mayers (1977) provides analytical procedures for a feature or component analysis of units on the various levels of the phonological hierarchy.

This premise leads the analyst to expect to find that some phonetically similar sounds are allophonic variations of one phoneme. The application of this premise in this analysis can be seen especially in the description of phonemes and their allophones in Section 3.3.2.

"Second premise: Sound systems have a tendency toward phonetic symmetry." This is what Sapir (1925) was saying when he wrote of "an intuitive "placing" of sounds in a pattern with reference to one another." Pike writes of a tendency towards phonetic symmetry, Sapir of a phonemic pattern. The former is a manifestation of the latter. A symmetrical phoneme pattern which has been discovered in a language can influence a decision as to the phonemic status of other sounds, depending on whether the existing phonemic pattern can be extended to embrace the other sounds to form a larger, equally regular pattern. Taken by itself, this premise has something of a hocus pocus flavour about it; but it must be considered not alone but as one of a set of premises, upon which, as a whole, the procedures are based. Taken as a whole in this way, the premises reflect an assumption that in every language there exists a pattern which the linguist must seek to discover. An example of this in the present analysis was the gradual discovery of the pattern existing between the obstruent phonemes. As studies of phoneme distribution and allophonic manifestation progressed, more and more evidence confirmed that there are two sets of obstruent phonemes, the members of one set contrasting with the members of the other set. More and more ways were discovered in which the members of each set behave alike. For further details see Section 3.2.3.5.

"Third premise: Sounds tend to fluctuate ... If this fluctuation is between noncontrastive segments, it is structurally nonsignificant and should not be symbolised in a phonemic alphabet." The influence of this premise also will be apparent in Section 3.3.2.

"Fourth premise: Characteristic sequences of sounds exert structural pressure on the phonemic interpretation of suspicious segments or suspicious sequences of segments." This premise has been applied in the interpretation of items which might be a consonant or a vowel or which might be a sequence or a unit. For further details see Section 3.2.

In addition to these four major premises, Pike presents thirty-three subsidiary or related premises (1947b:61ff.). Some of these will be discussed in this section, others in the course of that part of the analysis to which they are particularly relevant.

An assumption made throughout the analysis presented in this study is that phonological, grammatical, and lexical analyses need to proceed together, since the phonemic analysis cannot be completed without at

least some morphemes being differentially identified on the basis of meaning (1947:62). Bloch ([1941] 1957:93ff.) considered that phonemics must be based solely on phonetics and kept free from meaning and grammar. Joos (1957:96) in his footnote to Bloch's paper writes that "the ghost of the slain dragon continued to plague the community of linguists under such names as 'grammatical prerequisites to phonemic analysis'."[1] Today, with the advent of transformational generative grammar, we would have to say, if we maintain Joos's metaphors, either that the dragon is resurrected and rampaging as never before or that the plague is so contagious that few linguists have escaped it.

This was not the only issue on which Pike held, amongst American structuralist linguists, a minority view which later became a majority view. Bloomfield and the Bloomfieldian school asserted that linguistic units, including the phoneme, must be defined in mechanistic terms; but Pike maintained the mentalistic view that the phoneme is psychologically real to the native speaker. This principle is of fundamental importance to Pike as it was to Sapir. It underlies all Pike's other premises, and in turn his analytical procedures. In stating his reasons for his premises Pike writes, "The premises for this volume are chosen from existing theory or postulated for the first time, so as to lead the student to arrive at an analysis which parallels the vague or explicit observable reactions of speakers to their own sounds" (1947b:64). Since the psychological reality of the phoneme is a basic premise assumed by Pike, and in turn in this study, a few pages will be taken here to discuss differing attitudes taken on the issue by various linguists and linguistic schools.

In traditional grammar in the nineteenth century, linguists expected to find psychological explanations. Baudouin de Courtenay defined the phoneme as "a mental reality, as the intention of the speaker or the impression of the hearer, or both" (Twaddell [1935] 1957:55ff.). De Courtenay wrote of "mental images" and the "psychophoneme", a concept taken up by the Prague School. Saussure (1916) describe "la langue" as a psychological entity. Sapir (1925) clearly considered the phoneme to be psychologically real. He writes of "an intuitive 'placing' of sounds in a pattern with reference to one another."

Bloomfield (1922), although influenced by Sapir and Saussure and by Wundt's psychology, took an antimentalistic stand.

> We are casting off our dependence on psychology, realizing that linguistics ... must study its subject matter in and for itself ... We must study the way people talk-without bothering much about the mental processes that we may conceive to underlie or accompany these habits.

In making this statement, Bloomfield was not denying the existence of

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[1] A reference to Pike 1947a.

mental processes, nor the possible existence of psychologically real linguistic units, rather he was saying that it is not the province of the linguist to enquire into such questions. As a pioneer staking out the land, Bloomfield was setting up the boundaries of linguistic science. He took a stand against mentalism in linguistics because he wanted to see linguistics established as an exact science. It was for the same reason that Twaddell (1935) argued against ascribing mental reality to the phoneme; not because the phoneme did not have such a reality, but rather because it was not feasible methodologically to pursue such an inquiry. He said, "In short, until positive and unambiguous evidence of the mental reality of phonemes can be adduced, it appears methodologically dangerous to define the phoneme in terms of mental reality." So the antimentalistic position taken by Bloomfield and by most linguists of the Bloomfieldian school (with the notable exception of Pike) was not a denial of the psychological reality of linguistic units, but rather a denial that investigation of mental processes should be a goal of the linguist. It was a question of definitions. They chose for pragmatic reasons to define linguistics in mechanistic terms, and so the phoneme was defined in mechanistic terms. Linguists of the American structuralist tradition never denied the possibility of some psychologically real linguistic unit within the mind, but if there were such a unit, it was not embraced by their definition of the phoneme. Bloomfield (1922) said, "What happens in the mind of humans can only be inferred from their speech and other observable facts", and this was his reason for concerning himself only with "speech and other observable facts" and not with "mental processes".

Sapir (1933), on the other hand, looked on "speech and other observable facts" as the data on which to base inferences as to what happens in the mind.

> In the physical world, the naive speaker and the listener utter sounds or perceive them, but what they themselves feel while they speak or listen, are the phonemes. They organize the fundamental elements of their linguistic experience into definite functional and esthetic forms, each of which is delimited in the complex whole of all the possible sound relationships, by its own laws of relationships ... If from the psychological point of view the phonemic attitude is more basic than the strictly phonetic attitude, it should be possible to discover it in the spontaneously pronounced judgments of individuals who are complete masters of their language from the practical standpoint, but who have no rational or consciously systematic knowledge of it.

In the same paper Sapir writes, "... in the course of long experience in the recording and analysis of unwritten languages, American Indian and African, I have gathered together concrete proofs of the fact that the naive speaker does not hear phonetic elements, but phonemes." He gives examples of the sort of "spontaneously pronounced judgments"

which can reveal the phonemic system of the speaker, for example "the difficulty (or impossibility) of teaching a native speaker to take into account purely mechanical phonetic variations, variations which for him have no phonemic reality, and which therefore he does not 'hear'." In Sarcee, Sapir was attempting to solve the problem: "Were certain words which appeared to be homonyms really homonyms or did they show certain slight, not immediately appreciable, differences?" His interpreter said they were totally different. Although objectively there was no difference, Sapir discovered by further elicitation based on the intuitive judgment of his interpreter that there was a difference in the potentiality of the final vowels of the two words. In another example Sapir shows how, in writing his native Nootka, Alex Thomas's spelling was always essentially phonological. Sapir writes, "... it is after the study of his texts that I have learned to appreciate, in the proper degree, the psychological difference between a sound and a phoneme." He continues, "the phonetic 'ignorance' of an untutored native showed itself to be more accurate, from the phonological point of view, than the 'science' of the experts." So the "other observable facts" from which Sapir inferred what happens in the mind of humans included how they wrote and what they themselves said about their language. As an English judge commented, "The state of a man's mind is just as much a fact as the state of his digestion." Sapir was eliciting the state of the speaker's mind - his intuitive judgments. These judgments were the facts which constituted the evidence for the underlying mental patterns and processes.

Pike was clearly greatly influenced by Sapir, to whose memory he dedicated his *Language in relation to a unified theory of the structure of human behavior*. In this work he writes, "For some time I have insisted on the fact that 'explicit observable reactions' of speakers to linguistic material are part of the data which must be analyzed as essential to the founding of an adequate phonemic theory and procedure" (1967:352).

The advent of transformational generative grammar set the pendulum swinging back from the antimentalistic stand of the early thirties to the mid-fifties. The widespread acceptance of a mentalistic theory of language has resulted in linguists becoming involved in observation and experimentation into mental processes. Transformational grammarians have set out to account for the 'competence' of the native speaker (Chomsky 1957). The grammar is supposed to describe the set of internalised rules a speaker has acquired which enable him to use his language. Also the grammar is to represent psychological reality (Chomsky 1962:548). But in discarding the antimentalistic view of

language, transformational grammarians also discarded the phoneme as it has traditionally been recognised - called the "conventional phoneme" by Pike (1967:353), the "taxonomic phoneme" by Chomsky (1964) and the "autonomous phoneme" by Postal (1968). Transformational grammarians regard the systematic phoneme as the underlying psychologically real form from which surface forms are derived. Economy and simplicity are highly valued and the most economical grammar is the most highly valued. To produce a simple and economical solution, abstract underlying forms which never appear on the surface are sometimes posited. This practice was objected to by Kiparsky and others on the ground that there is no justification for positing an abstract underlying form for which there is no evidence. In a theory which sets out to describe "competence", there must be evidence that a posited underlying form really is part of the speaker's competence. Kiparsky (1968) claims that simplicity is not the only criterion for evaluating a grammar and that constraints on abstractness should also be taken into account in the evaluation. Hyman (1970) claims support for his abstract solution involving absolute neutralisation in Nupe on the grounds of external evidence - the way that Yoruba loan words are modified in Nupe. The same rules which derive the surface forms from the underlying forms containing the abstract segments can be used to account for the changes which take place when certain Yoruba words are borrowed into Nupe. The segments in the Yoruba words are the same phonetically as those in the abstract underlying forms. The derived surface forms of the segments are the same as in the loan words after modification according to the phonemic grid of the Nupe speaker. Hyman claims that "the underlying systematic phonemes reveal a deeper pattern congruity than is evident from the surface, because they are psychologically real." He claims that it is the application of the phonological rules for deriving surface forms from underlying forms to Yoruba loan words which causes the change. "These rules exist for the Nupe and are something real in his language and mind." So Hyman presents an abstract solution but also presents evidence to show that the underlying form and phonological rules by which the surface form is derived are psychologically real. He said, "There is only one theoretically correct and explanatorily adequate form of grammar that we seek to discover", and this grammar is "psychologically real".

Ohale (1974) considers that arguments as to whether underlying forms should or should not be abstract should be based, not on purely structural arguments, but on psychological tests. "It seems to me that the important question should not be whether phonology is abstract or concrete, but rather what evidence there is for the psychological

reality of a particular posited underlying form." The tests she carried out on Hindi showed that speakers who produce phonetically identical forms may be operating from very different internal grammars. Such results at first appear to be inconsistent with the view of Hyman that "there is only one theoretically correct and explanatorily adequate form of grammar that we seek to discover" and that this grammar is "psychologically real". But Hyman is not saying that there will be only one grammar for each language. As Ohala's test shows, different speakers may have different grammars. What Hyman is saying is that the grammar of a language is psychologically real.

Antworth (1975) argues against abstract solutions which involve imaginary segments because of the lack of evidence to support them.

> Although abstract solutions appear to make useful generalizations about a language, there is not adequate empirical evidence to support the claim that they correctly reflect the native speaker's language competence. We must base our research on a theory that assumes as little as possible about the competence of native speakers. Heavy constraints must be placed on abstractions resulting in a weaker theory that seeks to make only the generalizations that reflect the native speakers's true competence.

Pike writes of Chomsky that "in his reading of Sapir (see Chomsky, 1962, Section 4.2., page 532), he senses support for the psychological relevance of morphophonemic units [Chomsky's 'systematic phonemics'] but not the equally-available support for the relevance of conventional phonemes" (1967:353). Schane (1971) argues that the phoneme does have a place within generative phonology, in spite of claims to the contrary by Halle (1959), Chomsky (1964), and Postal (1968). "The notion of surface contrast which lies at the very heart of classical phonemics, plays a significant role within phonology: until generative phonology can capture this notion it fails to characterize an important aspect of linguistic systems." Longacre (1976:257) writes, "The phoneme itself as a surface structure unit was exorcised by the first generation of TG people only to be reinstated by some of their intellectual grandchildren (cf. Schane, 1971) in recent years."

In the preceding pages of this section, I have tried to show that the antimentalistic position taken by various linguists was not a denial of the psychological reality of linguistic units, but rather a denial that the investigation of mental processes should be one of the goals of the linguist. There were linguists such as Sapir and Pike who never associated themselves with the antimentalistic stand. In the following presentation of some of the evidence for the psychological reality of linguistic units and in particular for the psychological reality of the phoneme, it will be seen that much of the evidence was presented by Sapir forty or fifty years ago (1925, 1933). Of the

remaining evidence, some has been taken from experiments conducted by psychologists, some from experiments by linguists. The boundaries of linguistics have been extended to cover territory which Bloomfield and the Bloomfieldian School would have regarded the province of the psychologist or the sociologist. There is ever-increasing interest among linguists in psycholinguistics and sociolinguistics. Surely Sapir, at least, would be happy to see it.

As most linguists (including those holding to antimentalistic theories) have observed, speakers interpret foreign sounds through the phonemic grid of their own language. Trubetzkoy (1939) wrote, "Each person acquires the system of his mother tongue, but when he hears another language spoken he intuitively uses the familiar 'phonological sieve' of his mother tongue to analyze what has been said." If this is true, then by studying the way a person pronounces foreign words, the linguist should be able to find out something about the phonological sieve - the phonemic system of the speaker's own language. This was the basis of Hyman's claim that the way Yoruba words were changed when borrowed into Nupe was evidence for the phonological system existing in the mind of the Nupe speaker.

Taking this orientation as being valid, my own tests (see Section 4) were evidence for the validity of my analysis of Kobon. My Kobon language assistant, Lipgi, hearing the unfamiliar word Adam repeated it as ['andam]. Word medially Kobon /d/ is manifested as a voiced alveolar stop preceded by a homorganic nasal [nd]. In repeating ['adam] as ['andam], he was reconstructing the acoustic signal through the grid of the phonemic system which is psychologically real to him. It revealed something about his phonemic system. In a second instance, the way in which a Kobon, Aig, repeated New Guinea Pidgin words revealed much about his phonemic system (see Section 4.1.). It is not necessary that the words with which the language assistant is prompted be actual words from a language. The essential point is that sounds are being interpreted according to the hearer's phonemic system, reconstructed according to that system, and repeated. With a co-operative language assistant, the sounds may be incorporated into made-up words. So words might be made up with various word medial consonant clusters to see which clusters the assistant separates with a schwa (if this is a production process in the language). I used possible but non-existent Kobon words to test whether my language assistants 'heard' the difference between voiced and voiceless obstruent sounds in various positions of the word. The results showed that the distinction between [tc] and [dz] was heard initially but not medially, suggesting that, while voicing was the phonetic distinction between /c/ and /j/ initially,

medially it was the presence of the preceding homorganic nasal which was the distinction, and not voicing. This was later confirmed when it was found that /c/ has an allophone [dz] which fluctuates with [tc] word medially.

The intuitive judgment of the native speaker can also be seen from the way he writes his own language. Some of the evidence from Sapir's paper 'The Psychological Reality of Phonemes' has been referred to above. Sapir regarded the phonological accuracy of the naive speaker's writing as vital evidence for the existence of phonemes as a psychological reality in the speaker's mind. Gudschinsky (1973:133) made use of the following test in which a naive speaker wrote his language to discover an aspect of the phonemic system which existed in his mind.

> We taught a language helper to read a small number of consonants and all the oral sounds of his language. No instruction whatever was given with regard to the crucial matter of the allophones which were the whole purpose of the test. He was taught the consonants in two positions (1) initially in syllables and (2) finally in syllables that occured first in a word followed by a second syllable, e.g., sotpa. Having practised and learned many such syllables, he was given a set of cards, on each of which appeared a single letter. Now the real test began: he was asked to arrange some of his cards to spell out the word sowa. We watched with great interest. First he pulled out the x, which in Maxakali orthography represents s. Then came an o. He stirred around among the letters and finally pulled out a t. There it was: xot. "Like that you spell it," he said with finality.

This experiment showed that psychologically the native speaker equated the phonetic sequence [wa] occurring word finally, with the [t] occurring word initially and medially.

In yet another case, students' spelling and reading problems in literacy classes led Jean Shand (1972) to believe that his phonemic analysis and orthography were not accurate in certain respects. In reading the signal is entirely visual, but the decoding process results in the matching of the code with a mental unit, as in the acoustic perception of oral communication. One would expect that the closer the correspondence between mental unit and written symbol, the easier and quicker would be the process of learning to read. If it is true that "a phonemic orthography is the easiest for the native to learn to read and write" (Pike 1947b:61, premise 1), then it should also be true that the orthography which the formerly illiterate person finds easiest to read and write represents his phonemic system most accurately. It should be possible to use experiments based on reading and writing as part of the evidence for the phonemic analysis. It was the spelling and reading problems which people in his literacy classes were having which led Shand to make a re-analysis which allows for partial overlap between two vowel phonemes and complete overlap between two consonant

phonemes. The latter solution would be unacceptable to most linguists, but the reaction of native speakers argues strongly for such a solution. Shand suggests that "the apparent neutralization arises from co-existing phonological sub-systems. The two sub-systems are (a) the calling style and (b) the proper names system. The two sub-systems have the same phonemes as the main system but different allophones."

Insights can also be gained from the native speaker's judgments about his own language. Shand's suspicions that his analysis was inaccurate were aroused not only by students' spelling and reading problems but also by what they said about the orthography. They objected to some spellings, they giggled at others. Gudschinsky (1973:129) asked her language assistant for his judgment as to which of two sounds a third sound was more like. It was Sapir's Sarcee interpreter's judgment that two objectively identical sounds were "totally different" which led him to investigate and discover what that difference was (1933).

The ability to substitute one phoneme for another is further evidence for the psychological reality of phonemes. A person who is asked to say other words like **lot**, might well respond with **hot, not, cot,** and **pot**. The ability to select different phonemes to make the substitutions is evidence that these phonemes exist as psychologically real units in the mind. The speaker selects a unit and encodes it. Children tend to make substitutions in the acquisition of speech. Leopold (1939) reports that the little girl, Hildegard, regularly substituted [ʒ] for [y] word initially so that she pronounced **you** as [ʒu]. This could not be solely because of physical limitations since at the same time she substituted [y] for [l] so that she pronounced **lutscht** as [yu]. The substitution of [ʒ] for [y] and [y] for [l] was regular. This seems to be consistent with the theory that in speech phonemes which exist in the mind are being encoded. Hildegard's encoding results in a manifestation which is very different from standard accepted speech, but her parents who are familiar with the peculiarities of her speech will decode the signal without difficulty, and 'match' it with /y/ which for them, too, exists in their minds.

During the past fifteen years there has been much interest among linguists in speech error data. This can be traced back to Hermann Paul (1886). Freud was interested in the way unconscious slips of the tongue revealed underlying repressed thoughts. In the chapter on slips of the tongue in his *Psychopathology of Everyday Life*, he suggested that "an understanding of the mechanisms involved in slips of the tongue may lead towards an elucidation of the probable laws of formation of speech" (1901). Hockett took up this suggestion in 'Where the tongue slips, there slip I' (1967). His intention was to analyse slips

of the tongue using the combined tools of linguistics and Freud's psychological insights. Slips of the tongue are further evidence supporting the theory that phonemes are psychologically real. In referring to **our queer old dean** instead of **our dear old Queen**, it seems that the speaker has selected psychological units to be encoded but that before encoding they have been transposed. The speech signal is continuous, but it encodes discrete psychological units which can be transposed, added, or omitted. Fromkin (1971) points out that in a slip like [t^hat∫ sk,eip] for scotch tape [skat∫ t^heip], the aspiration of the stop and the palatalisation of the /k/ are adjusted in accordance with their new contexts. Stampe describes this adjustment as a natural process which is innate, as opposed to those phonological constraints which do not involve processes, which are learned.

All of the above evidence has been cited to support the view that phonemes exist psychologically. Jakobson (1941) would explain failure to hear the difference between two objectively different sounds by saying that there is no distinctive difference between those sounds in the mother tongue of the hearer. This raises the question whether distinctive features are psychologically real. The view taken in this paper is that there is no justification for regarding distinctive features, as opposed to phonemes, as being psychologically real. This is not to say that a phoneme does not have distinctive features, or that distinctive features do not play a part in the process whereby an acoustic code is 'matched' with phonemes in the mind, but the view taken here is that in speech perception the continuous acoustic signal is matched with phonemes which exist in the mind. Speech spectography and research into the function of formants in speech amply testify to the fact that speech is a continuum. Goldsmith (1976:16ff.) writes of the "orchestral score" for the articulation of speech. There is a great deal of overlap in the contribution of the performers: lips, tongue, velum, and larynx.

> The normal assumption about phonological representation implies that in processing a signal, we learn to shift around slightly the horizontal alignment of commands and justify it - and patch it up so that it may be sliced up vertically into the phonologically, and hence psychologically, real segments.

Goldsmith considers that this "Absolute Slicing Hypothesis" fails since it exludes part of the linguistic signal - pitch. Goldsmith's reasoning argues against the psychological reality of phonemes as "columns" of articulatory features and against mechanistically defined phonemes, but not against the existence of psychological phonemes, since to match a code with the latter requires no slicing.

Horton and Turnage (1976) bring together the results of some interesting experiments in a discussion on the sounds of speech. Liberman, Cooper, Shankweiler, and Studdert-Kennedy (1967) consider that formants transmit phonemes in parallel rather than in a string. This helps to explain the results of compressed speech experiments (Foulke 1971, Orr, Friedman, and Williams 1965) which showed that speech can be understood even at 400 words per minute. It also substantiates the theory that the speech signal is a continuous code which is matched with psychological phonemes. Such an explanation is needed to account for subjects "hearing" the missing phoneme in the following experiment by Warren (1970), summarised by Horton and Turnage (1976: 307).

> He began with tape-recorded sentences and removed from each sentence a single phoneme together with portions of the adjacent phonemes that might provide transition clues. The gap was either filled with an extraneous sound such as a cough or left unfilled. When the gap was unfilled, listeners had no difficulty detecting it and locating it correctly in the sentence. When the gap was filled, however, subjects believed they heard the missing phoneme and located the gap somewhere else in the sentence without interfering with the intelligibility of any phoneme. Warren points out that for listeners familiar with English these "phonemic restorations" are perhaps not so surprising, since no other phoneme could produce an English word. But this does not explain the listener's lack of awareness, the illusion that the sound was heard.

So the psychologically real phoneme seems to be based upon a complex intertwining of the components of the phoneme in the various contexts in which it occurs, the distinctions between the phoneme in context and other phonemes in like context, and a pattern of distribution of the phoneme. Because of this complex intertwining of relationships, the phoneme has a variety of manifestations which may at times overlap with another complex of relationships (another phoneme). But the variety of manifestations boils down to a common denominator which is psychologically real and which the native speaker can extract from the complex continuous signal with amazing speed.

Horton and Turnage (1976:309) review "some of the results of studies in categorical perception that compared speech and nonspeech inputs in the form of identical second-formant transitions." They find that "these results suggest that the distinction between speech and nonspeech is not made at the acoustic or auditory level but instead may depend on whether the speech-processing mechanisms essential to the extraction of phonemes or phonetic features are engaged." Horton and Turnage (1976:318-320) also discuss some studies by Moffit (1971), Eimas, Siqueland, Jusczyk, and Vigorito (1971), and Morse (1972) which suggest that:

> certain of the structures on which the adult depends for speech perception are present in the infant soon after birth ... taken together, these findings appear to suggest that categorical perception[1] is accomplished by a process that is operative at a surprisingly early age ... Findings such as these suggest that language acquisition and use may depend in an important way on prewired connections in the brain.

This would be consistent with a view of language as a creation of God as the means of communication. There are thousands of different codes, but the process of encoding and decoding is the same for all. Everyone possesses the ability to perform these processes and so to communicate.[2]

In this section, I have argued for the psychological reality of the phoneme, a basic premise assumed by Pike (1947) which underlies all his other premises and the set of analytical procedures based upon them. I consider both the premise and the analytical procedures to be valid. Though some might argue that the model is outdated, nevertheless the fact remains that it is through an understanding of the premises and the application of the analytical procedures presented by Pike (1947), that many students of linguistics are getting to grips with the dynamics of phonology. Since the model is valid, it has been used for the segmental analysis of Kobon which is presented in Section 3.

3. SEGMENTAL ANALYSIS

This section contains a segmental analysis of Kobon. The theoretical orientation is that of Pike (1947 and 1967). In Section 3.1., the phones are presented together with a list of pairs of sounds which are similar enough phonetically that they could be suspected of functioning as a single emic unit. In Section 3.2., sounds are re-segmented primarily on the basis of the structural pressure exerted by non-suspect consonant vowel patterns. Next the phonemes are described in terms of the feature mode, i.e., the set of contrastive-identificational features (Section 3.3.1.), the manifestation mode, i.e., the range of variability (Section 3.3.2.), and the distribution mode (Section 3.5.). In order to facilitate the statement of the distribution of the phonemes, some tentative remarks about the structure and distribution of the syllable are made in Section 3.4. and about the phonological word, the phonological phrase, and the phonological sentence in 3.6. As mentioned in Section 2., Pike (1967) views the phonological component of a language as a hierarchy. Thus each unit functions within the unit on the

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[1]The term 'categorical perception' is used to mean the perception of phonemes but not of variations between different occurrences of the same phoneme.

[2]For a discussion of language as a creation of God see Longacre 1976:311ff.

next higher level and consists of units from the next lower level. Much work remains to be done on analysis of the higher levels.

3.1. *THE PHONES*

The phones which have been found to occur in Kobon are presented in Chart 1.

CHART 1

THE PHONES OF KOBON

	Bilabial	Labiodental	Alveolar	Retroflexed	Alveopalatal	Velar	Pharyngeal
vl. unaspirated stop	p					k	
vl. aspirated stop	p^h		t^h			k^h	
vd. stop	b b^w		d			g	
nasal	m m^w		n		ɲ	ŋ	
vl. fricative	Φ	f	s		tc	x kx	h
vd. fricative	β	v			dz	ɣ	
lateral			l ɬ	! !̲	ʎ		
trilled vibrant			r r̲				
flapped vibrant			ɾ ɾ̲				
vl. semivowel	ʍ						
vd. semivowel	w	ʋ			y		

	Front	Central	Back
High	i	ɨ	ɯ u $u^ʟ$
Mid	e̞	ə ʌ	o̞
Low		a	

Pike's analytical procedures include the listing of suspicious pairs, i.e., pairs of phones which are similar enough phonetically they could be suspected of functioning as a single emic unit (1947b:69). See Chart 2.

CHART 2

SUSPICIOUS PAIRS OF PHONES IN KOBON

p	p^h	k^h	g	k	k^h	ɨ	ʌ
p	b	d	r	k	g	ɨ	i̱
p^h	b	d	ɾ̲	k^h	g	ə	i̱
b	b^w	r	r̲	x	kx	ə	ɯ
n	ɲ	r	ɾ̲	x	k	ə	ʌ
n	ŋ	r	ɾ̲	x	k^h	i̱	ɯ
ɲ	ŋ	r̲	ɾ̲	kx	k^h	u	u^l
ɸ	f	r̲	ɾ̲	kx	k	u	ʊ
ɸ	ɱ	ɾ̲	ɾ̲	x	h	u	o
β	w	l	ɬ	g	ɣ	u	i̱
β	ʋ	l	r	y	i	u	ɯ
ɱ	w	l	ɾ̲	y	ɪ	u	w
w	ʋ	l	l̤	i	ɪ	o	ʊ
ɱ	ʋ	l̤	l̤	i	i̱	ʊ	u^l
t^h	d	l	ʎ̲	i	ɨ	ʊ	ɯ
k	k^h	tc	dz	ɪ	ɨ	ʊ	w
k	g	tc	s	ɪ	ə	u^l	w

3.2. *RESEGMENTATION*

The phonemic interpretation of suspicious segment types and segment sequences by analogy to non-suspicious or predominant structural types and sequences is described by Pike in 1947:128ff.

3.2.1. Non-suspect Consonant-vowel and Syllable Patterns

A non-suspect consonant-vowel or syllable pattern is one which does not contain any suspect segments or suspect sequences of segments.

The following non-suspect consonant vowel patterns are found in syllables:

CV	Initial	[dʊ'badu]	/dubadu/	*'crooked'*
	Medial	[u'ɾ̲aβe]	/urafe/	*'bird sp.'*
	Final	['ɾ̲əmni]	/rəmni/	*'this'*
CVC	Initial	[ɸəl'bin]	/fəlbin/	*'I have pulled'*
	Final	[mə'l̤eɸ]	/məl̤ef/	*'dry'*
V	Initial	[a'ʌaŋgʌ]	/aʌagə/	*'tree sp.'*
VC	Initial	['aβdi nəŋ-]	/afdi nəŋ-/	*'to overhear'*
	Final	[l̤u'ʌɸ]	/l̤uəf/	*'he scraped'*

The following non-suspect syllable patterns are found in words:

1.	CV	[ma]	/ma/	*'foot'*
2.	CVC	[mes]	/mes/	*'tree sp.'*
3.	CV.CV.	['wimʌ]	/wimə/	*'tree sp.'*
4.	CV.CVC	[mə'leɸ]	/məlef/	*'dry'*
5.	CVC.CV	['r̆əmnu]	/rəmnu/	*'that'*
6.	CVC.CVC	[nəŋ'bin]	/nəŋbin/	*'I saw'*
7.	CV.CV.CV	[dʊ'badu]	/dubadu/	*'crooked'*
8.	CV.CV.CVC	[ɸə'ɸanəm]	/fəfanəm/	*tree sp.'*
9.	CV.CV.CV.CV	[dʊdʊ'badu]	/dudubadu/	*'crooked'*
10.	V	[u]	/u/	*'there'*
11.	VC	[as]	/as/	*'frog'*
12.	V.CV	['ana]	/ana/	*'soul, spirit'*
13.	V.CVC	[u'r̆eɸ]	/uref/	*'short'*
14.	V.CV.CV	[u'r̆aβe]	/urafe/	*'bird sp.'*
15.	VC.V	['aŋa gʌɸ]	/aŋa gəf/	*'to make a noise'*
16.	VC.CV	['aβdi nəŋ-]	/afdi nəŋ-/	*'overhear'*
17.	VC.CVC	['amɸel]	/amfel/	*'immediately'*

3.2.2. The Status of Items which may be either Consonant or Vowel

The premise which has been applied here is that "the dichotomy between vowel and consonant is not strictly an articulatory one but is in part based on distributional characteristics" (Pike 1947:62, premise 16).

Syllabic high front and back vocoids [i] and [u] are interpreted as vowels, as they occur as the nucleus of the syllable. Non-syllabic high front and back semi-vowels [y] and [w] are interpreted as consonants as they occur as pre-nuclear syllable margins. (For analysis whereby a semi-vowel which contiguously follows a vowel is interpreted as a consonant see Davies 1980:197-214).

[i]	[i]	/i/	*'here'*
	[ɸint^{h}]	/fid/	*'banana'*
	[ɸi]	/fi/	*'offspring'*
[y]	[yu]	/yu/	*'you throw* - imp.'
	['yambo!]	/yabo!/	*'taro sp.'*
	['k^{h}ayaŋ]	/xayaŋ/	*'again'*
[u]	[u]	/u/	*'there'*
	[k^{h}um^{h}]	/xub/	*'big'*
	[mu]	/mu/	*'blue'*
[w]	[wim]	/wim/	*'a bow'*
	[a'wan]	/awan/	*'a wing'*

[h] is interpreted as a consonant as it only occurs in a non-syllabic position as pre-nuclear syllable margin.

[hel]	/hel/	*'a trap'*
[wə'haɭɨn]	/wəhaɭɨn/	*'yellow'*

3.2.3. The Status of Items which may be either Sequences or Units

As can be seen in the list of non-suspect syllable types (Section 3.2.1.), non-suspect consonant clusters do not occur in the syllable, but non-suspect clusters of two consonants do occur word medially across syllable boundaries.

3.2.3.1. *Vocoid Clusters*

The vocoid clusters [ai] and [au] have been interpreted as complex syllable nuclei (Pike 1947b:62) since they each form the nucleus of a syllable of one mora timing, and one stress value occurs over the whole cluster. Wherever sequences of vocoids occur as the nucleus of two adjacent syllables primary stress falls on only one nucleus. Because neither vowel of the cluster is generally more dominant than the other, as either level or gliding tone may occur, and as new phonemes do not need to be set up, this interpretation has been followed rather than interpreting the clusters as glided phonemes. It could be argued that [i] and [u] as members of [ai] and [au] are in non-syllabic positions and are therefore /y/ and /w/ and not /i/ and /u/. But such an interpretation would posit word final consonant clusters, e.g., /yawr/* instead of /yaur/ *'bird'*. Thus, in distribution, both [ai] and [au] act like single nuclear phonemes. (For alternative analysis of [ai] and [au] as /ay/ and /aw/ see Davies 1980:197-214).

/ai/	['naiwʌʌ]	/naiwəʌ/	*'wife's sister'*
	[ɸai]	/fai/	*'girl'*
/au/	[au'bin]	/aubin/	*'I have come'*
	[gau]	/gau/	*'there'*

Other vocoid clusters are interpreted as sequences since they occur only across syllable boundaries. Each vocoid forms the nucleus of a syllable and primary stress falls on only one nucleus.

/u.ə/	['ɭu.ʌɭ]	/ɭuəɭ/	*'horizontal timbers'*
/i.e/	['kʰi.e lʌɸ]	/xie ləf/	*'hungry'*
/i.ə/	['wi.ʌr]	/wiər/	*'mango'*
/i.a/	['gi.aŋ]	/giaŋ/	*'below'*
/o.u/	['mo.u]	/mou/	*'there'*
/ai.a/	[wʊhai.'ambin]	/uhaiabin/	*'I laugh'*

/ai.ə/	['ai.ʌn]	/aiən/	*'witch'*
/au.a/	[lau.'ambin]	/lauabin/	*'I cook'*
/au.u/	['dau.ʊmp^{h}]	/dauub/	*'he brought'*

A non-phonemic transitional velar fricative tends to occur between certain vowels occurring as a vocoid cluster across syllable boundaries (Section 3.6.1.1.).

3.2.3.2. *Labialised Contoids*

/b/ and /m/ sometimes occur labialised before high or mid, central or back vowels with some speakers, particularly from the Singapi area. The resulting sequences [b^{w}] and [m^{w}] are interpreted as /b/ and /m/ with allophonic labialised release because the labialisation is very short and predictable and the consonants are bilabial.

[b^{w}]	[b^{w}ɯ]	/bɨ/	*'man'*
	[b^{w}ɨʌ]	/bɨʌ/	*'sugar'*
	['kxamb^{w}ʌ]	/xabə/	*'stone'*
[m^{w}]	['am^{w}ol məhau]	/amol məhau/	*'man and wife's father'*

3.2.3.3. *Homorganic Affricates*

[tc], [dz], and [kx] are each interpreted as a unit in all environments because they occur word initially and finally and there are no non-suspect consonant clusters within the syllable.

[tc]	[tci]	/ci/	*'milk'*
	['tcatcal gʌΦ]	/cacal gəf/	*'to break into little pieces'*
	[batc]	/bac/	*'grandfather'*
[dz]	[dzoˌ]	/joˌ/	*'tail of bird'*
	[aɲ'dzambin]	/ajabin/	*'I will walk about'*
	[k^{h}aɲtc]	/xaj/	*'pig'*
[kx]	['kxambʌ]	/xabə/	*'stone'*
	[a'kxai]	/axai/	*'pitpit'*
	[yɪkx]	/ix/	*'over there'*

3.2.3.4. *Obstruents Preceded by Homorganic Nasals*

A particularly interesting aspect of Kobon phonology has to do with these sequences. "A sequence of two segments may in some languages constitute a single phonetically complex phoneme" (Pike 1947:62, premise 20). This premise has been applied in the interpretation of the sequences of stop preceded by homorganic nasal, which occur word medially and finally, as single phonetically complex phonemes /b/, /d/, /j/, and /g/. Word finally a voiceless set of obstruents preceded by

homorganic nasals occurs - [mp^h], [nt^h], [ɲtc], and [ŋk^h]. Phonetically the homorganic nasal corresponds in time to a full phoneme, but the phonetic sequences of nasal and stop are interpreted as units since there are no non-suspect consonant clusters within the syllable, and the nasal is always homorganic with the stop and is never syllabic.

[gamp^h]	/gab/	*'he does'*
[yant^h]	/yad/	*'I'*
[k^{h}aɲtc]	/xaj/	*'pig'*
[haŋk^h]	/hag/	*'cucumber'*

The voiced allophones [mb], [nd], [ɲdz], and [ŋg] occur word medially only. Again phonetically the homorganic nasal corresponds in timing to a full phoneme. Thus the [m] in [a'ɬambin] /arabin/ *'I am going'* is the same length as the [m] in ['amgʌ] /amgə/ *'eye'*. However, since the members of this set are in complementary distribution with the voiceless set, and the nasal is always homorganic with the stop and is never syllabic, they too are interpreted as units.

['kxambʌ]	/xabə/	*'stone'*
[an'dan]	/adan/	*'path'*
[aɲ'dzamp^h]	/ajab/	*'he walks'*
[haŋ'gamp^h]	/hagab/	*'he speaks'*

The alternation of [b] with [mb] in [ham'badʌ] / [ha'badʌ] /habadə/ *'kunai grass'* is further evidence that [mb] is functioning as a unit. This is consistent with the assumption specified by Pike (1947:62).

> The investigator should assume that a specific morpheme contains the same sequence of phonemes every time and in every environment it appears, until or unless he finds definite evidence, by way of analytical procedures, which forces him to conclude that there has been a substitution (or loss or addition) of phonemes. This is helpful, since the morphological data gives clues as to the nonsignificant modification of phonemes.

Further, the spelling test (see Section 4.1.) in which my language assistant spelled the word [an'dan] /adan/ *'path'* as adan was confirmation that for him the phonetic sequence [nd] in that word was just one psychological unit, the phoneme /d/. Thus the obstruent phonemes /b/, /d/, /j/, and /g/ have allophones [mb], [nd], [ɲdz], and [ŋg] medially and [mp^h], [nt^h], [ɲtc], and [ŋk^h] finally respectively.

The obstruent phonemes /f, s, c, x/ pattern as a set in contrast with the set /b, d, j, g/. Chart 3 shows the phonetic components which distinguish the phonemes in one set from their counterparts in the other set. As can be seen from the chart, some phonemes have more than one possible manifestation in the same environment (for details of such fluctuation between allophones see Section 3.3.2.). Those components

which are present in all fluctuating forms of a particular phoneme in the same environment are taken to be the basic contrastive-identificational components which distinguish the phoneme from other phonemes in that environment. When a member of one set of obstruent phonemes is compared with its counterpart from the other set, it is possible to specify further the basis of the contrast in terms of contrastive-identificational components. Thus /f/ and /b/ are consistently distinguished word initially and medially by the component of friction and finally by the component of nasalisation. /c/ and /j/ are distinguished word initially by the component voicing, and finally by the component nasalisation. Word medially some manifestations of /c/ and /j/ are distinguished by the component nasalisation. [dz] as an allophone of /j/ is distinguished from [tc] as an allophone of /c/ not by the component of voicing alone, but also by the presence of /b/, /d/, /j/, /g/, or a nasal phoneme initially in the preceding syllable or a contiguous preceding consonant phoneme. [dz] as an allophone of /j/ is distinguished from [dz] as an allophone of /c/ solely by the presence of /b/, /d/, /j/, /g/, or a nasal phoneme initially in the preceding syllable, or a contiguous preceding consonant phoneme. /x/ and /g/ are distinguished word initially by friction or aspiration, finally by nasalisation and medially in all cases but one by friction or aspiration. [ɣ] as an allophone of /g/ is distinguished from [ɣ] as an allophone of /x/ solely by the presence of /b/, /d/, /j/, /g/, or a nasal phoneme initially in the preceding syllable. /s/ and /d/ are distinguished initially and medially by the components friction and voicing, and finally by the component friction. The question arises whether the component friction is the basic distinction between /s/ and /d/ since it serves to contrast this pair of phonemes in all environments.

When the contrastive-identificational components which distinguish pairs of obstruent phonemes are considered in this way, a pattern seems to emerge. This is consistent with the premise that "sound systems have a tendency toward phonetic symmetry" (Pike 1947b:59) and the theory of Sapir (1925) that in language there is "an intuitive 'placing' of sounds in a pattern with reference to one another." There is patterning and symmetry in the way that /f, s, c, x/ as a set contrast with /b, d, j, g/ as a set.

CHART 3

CONTRASTIVE-IDENTIFICATIONAL COMPONENTS
WHICH DISTINGUISH PAIRS OF OBSTRUENT PHONEMES

		Friction	Aspiration	Voicing	Nasalisation
Initially					
/f-b/	[ɸ, f-b]	x		x	
	[ɸ, f-p]	x			
/s-d/	[s-d]	x		x	
/c-j/	[tc-dz]			x	
/x-g/	[k^h-g]		x	x	
	[kx, x-g]	x		x	
	[k^h-k]		x		
	[kx, x-k]	x			
Medially					
/f-b/	[β, v, ⱱ-mb]	x			x
	[β, v, ⱱ-b]	x			
/s-d/	[s-nd]	x		x	x
	[s-d]	x		x	
/c-j/	[tc-ɲdz]			x	x
	[tc-dz]			x	
	[dz-ɲdz]				x
	[dz-dz]				
/x-g/	[k^h-ŋg]		x	x	x
	[k^h-g]		x	x	
	[kx, x-ŋg]	x		x	x
	[kx, x-g]	x		x	
	[ɣ-ŋg]	x			x
	[ɣ-g]	x			
	[ɣ-ɣ]				
Finally					
/f-b/	[ɸ-mp^h]	x			x
	[p-mp^h]		x		x
	[p^h-mp^h]				x
/s-d/	[s-nt^h]	x			x
	[s-t^h]	x			
/c-j/	[tc-ɲtc]				x
/k-g/	[k^h-ŋk^h]				x
	[kx, x-ŋk^h]	x			x

Both word medially and finally /b/ is distinguished from /f/, /d/ from /s/, /j/ from /c/, and /g/ from /x/ either by the component nasalisation or by the fact that there is an obstruent phoneme from the nasalised set or a nasal phoneme initially in the preceding syllable or that there is a contiguous preceding consonant. Word initially, however, nasalisation is not present, and in almost all instances it is the component voicing which distinguishes the pairs of phonemes in this position. /d/ and /j/ are always voiced initially and /b/ and /g/ almost always so. Sometimes, however, /b/ is manifested by [p] initially and /g/ by [k], and then the contrastive component is more properly interpreted as the presence or absence of friction. Indeed the component friction is contrastive in all word initial manifestations of /f, s, x/ as opposed to /b, d, g/, with the exception of the allophone [k^h] manifesting /x/ word initially. To include this allophone, the definition of the distinguishing component needs to be expanded slightly to cover both friction and aspiration. These two components fluctuate freely as manifestations of /k/ in all positions in the word. They also fluctuate in manifestations of /f/ word finally. This fluctuation together with the absence of any contrast based solely on the component friction as against aspiration is evidence for the absence of any emic distinction between the etic components of friction and aspiration. The difference is not heard by the native speaker. So the components of friction and aspiration distinguish /f, s, x/ from /b, d, g/ word initially, but not /c/ from /j/. Since all manifestations of /c/ and /j/ involve friction, that component is clearly not contrastive. Word initially, the contrastive-identificational component is voicing. It is interesting to note that the components of friction and aspiration almost always serve to distinguish /x/ and /g/ word medially and friction always distinguishes /f/ and /b/ word medially. On the grounds of this patterning or symmetry in the way that /f, s, c, x/ as a set contrast with /b, d, j, g/ as a set, they are called fortis and lenis obstruents respectively.

Block (1941) distinguished partial overlap from complete overlap.

> The intersection or overlapping of phonemes will be called partial if a given sound x occurring under one set of phonetic conditions is assigned to phoneme A, while the same x under a different set of conditions is assigned to phoneme B; it will be called complete if successive occurrences of x under the same conditions are assigned sometimes to A, sometimes to B.

Bloch considered that partial overlap never leads to uncertainty in practice and can therefore be admitted in theory without violating sound phonemic method. On the other hand, he considered that complete overlap always results from an error in the analysis. Pike (1967:299)

writes:

> ... in this theory we grant no homophonous phonemes within identical environments ... On the other hand, there is nothing within the theory to prevent certain variants of two phonemes from being homophonous within certain restricted but distinct environments (i.e., it allows 'overlapping' of phonemic variants).

In Kobon partial overlap occurs between /tc/ and /dz/ in, e.g., ['tcadzɪŋ] /cacɪŋ/ *'drum'* (which has the alternate form ['tcatcɪŋ]) and ['dzʊdzu gʌΦ] /juju gəf/ *'tired'*. In ['tcadzɪŋ], the affricate [dz] follows a fortis obstruent phoneme and is /c/, whereas in ['dzʊdzu], [dz] follows a lenis obstruent phoneme and is /j/. [dz] occurs word medially as an allophone of /j/ only following a lenis obstruent or nasal phoneme initially in the preceding syllable or contiguous to a preceding consonant phoneme. Otherwise /j/ is manifested word medially as [ɲdz]. Thus there is overlap but not intersection.

Similarly, partial overlap occurs between /x/ and /g/ in, e.g., [sʊ'ɣump^{h}] /sukub/ *'bird sp.'* (which has the alternate form [sʊ'k^{h}ump^{h}]) and ['gɨɣɨr] /gɨgɨr/ *'corn'* (which has the alternate form ['gɨgɨr]. In [sʊ'ɣump^{h}] the fricative [ɣ] follows a fortis obstruent phoneme and is /x/, whereas in ['gɨɣɨr], [ɣ] follows a lenis obstruent phoneme and is /g/. [ɣ] occurs word medially as a allophone of /g/ only intervocalically following a lenis obstruent or nasal phoneme initially in the preceding syllable in fluctuation with [g]. Otherwise /g/ is manifested word medially as [g] or [ŋg]. Again there is overlap but not intersection.

3.2.3.5. *Aspirated Obstruents*

[k^{h}] is accompanied by aspiration in all positions of the word; it is interpreted as a unit in view of the non-occurrence of consonant clusters within the syllable.

[k^{h}]	[k^{h}a]	/xa/	*'burial pit'*
	[a'k^{h}ai]	/axai/	*'pitpit'*
	[yɪk^{h}]	/ix/	*'over there'*

[mp^{h}], [nt^{h}], and [ŋk^{h}] are accompanied by aspiration and are interpreted as units in view of the non-occurrence of consonant clusters within the syllable.

[mp^{h}]	[a'ɾamp^{h}]	/arab/	*'he is going'*
[nt^{h}]	[a'l̥ant^{h}]	/alad/	*'horizon'*
[ŋk^{h}]	[wʌŋk^{h}]	/wəg/	*'garden'*

3.3. *THE PHONEMES*

It is appropriate to mention here some more of Pike's premises (1947b: 61ff.):

"Phonemes exist" (premise 3).

"In order to be considered submembers of a single phoneme, two segments must be (a) phonetically similar and (b) mutually exclusive as to the environments in which they occur" (premise 3). The former condition prevents, e.g., [k] and [a] from being united as one phoneme in English. The definition "phonetically similar" may lack precision but scores highly in practicality.

"Every phonetically distinct segment of a language is a separate phoneme unless it is a part of some more inclusive phonemic unit" (premise 4).

"Two segments are proved phonemically distinct if they consistently constitute the only difference between two words of different meanings" (premise 7).

"If two segments are submembers of a single phoneme, the norm of the phoneme is that member which is least limited in distribution and least modified by its environments" (premise 2).

3.3.1. Outline of Phonemes

As can be seen from Chart 4, the six general points of consonant articulation are bilabial, alveolar, retroflexed, alveopalatal, velar, and pharyngeal. The six modes of articulation are fortis obstruent, lenis obstruent, nasal, lateral, vibrant, and semivowel. The maximum number of these modes of articulation to contrast at a given point of articulation is five and this takes place in both the alveolar and alveopalatal regions. The maximum number of points of articulation occurring with a given mode of articulation is five, and this occurs in the case of fortis obstruents.

CHART 4

THE CONSONANTAL PHONEMES

	Bilabial	Alveolar	Retro-flexed	Alveo-palatal	Velar	Pharyngeal
Fortis obstruents	f	s		c	x	h
Lenis obstruents	b	d		j	g	
Nasals	m	n		ɲ	ŋ	
Laterals		l	ɭ	ʎ		
Vibrant		r				
Semivowels	w			y		

As can be seen from Chart 5, vowels contrast as to whether they are front, central, or back, and high, mid, or low.

CHART 5
THE VOCALIC PHONEMES

	Front	Central	Back
High	i	ɨ	u
Mid	e	ə	o
Low	a		

3.3.1.1. Suspect pairs of consonant phonemes contrasted. For examples of complementation see Section 3.3.2.1.

/b/ and /f/

set 1.	[ba]	/ba/	*'steep slope'*
	[Φa]	/fa/	*'you strike* - imp.'
set 2.	[bʌ]	/bə/	'clitic - *with*'
	[Φʌ]	/fə/	*'arrow'*
set 3.	[am'baɲ]	/abaɲ/	*'platform'*
	[a'βalʌ]	/afalə/	*'jaw'*
	[a'valʌ]	/afalə/	*'jaw'*
	[a'ʋalʌ]	/afalə/	*'jaw'*
set 4.	['gaubu]	/gaubu/	*'bamboo harp'*
	['gaβɨ]	/gafɨ/	*'star'*
set 5.	[aŋ'gabʌ]	/agabə/	*'shoot'*
	[haŋ'gaβe]	/hagafe/	*'blood'*
set 6.	[mamph]	/mab/	*'tree'*
	[r̆əm'naΦ]	/rəmnaf/	*'some'*

/d/ and /r/

set 1.	[dau'amp^h]	/dauab/	*'he brings'*
	[r̆au'amp^h]	/rauab/	*'he buys'*
set 2.	[dʌ]	/də/	*'salt'*
	[r̆ʌ]	/rə/	*'like'*
set 3.	[an'damp^h]	/adab/	*'he is mumuing'*
	[a'r̆amp^h]	/arab/	*'he is going'*
set 4.	['andɨk^h]	/adɨx/	*'you tie* - imp.'
	['ar̆ɨk^h]	/arɨx/	*'you leave* - imp.'
set 5.	[ΦʌnT^h]	/fəd/	*'yam'*
	[Φʌr̆]	/fər/	*'always'*
set 6.	[wʊnT^h]	/ud/	*'you take* - imp.'
	[wʊr]	/ur/	*'stick'*

/j/ and /c/

set 1.	[dzɪŋ]	/jiŋ/	*'upstream'*
	['tcɪŋʌ]	/ciŋə/	*'wing feathers'*
set 2.	['dzadzʌ]	/jajə/	*'root'*
	['tcatcal]	/cacal/	*'fragments'*
set 3.	['dzadzɪl]	/jajil/	*'mimicing'*
	['tcatcɪŋ]	/caciŋ/	*'drum'*
set 4.	['dzɪmdzɪm ɲ-]	/jimjim ɲ-/	*'to join'*
	['tcɪmtcɪ gʌɸ]	/cimci gəf/	*'it is stuck'*
set 5.	[aɲ'dzamp^{h}]	/ajab/	*'he walks'*
	[a'tcamp^{h}]	/acab/	*'salted leaf'*
set 6.	[k^{h}aɲtc]	/xaj/	*'pig'*
	[batc]	/bac/	*'grandfather'*

/g/ and /x/

set 1.	[ga]	/ga/	*'he did'*
	[k^{h}a]	/xa/	*'grave'*
set 2.	[gʌɸ][kʌɸ]	/gəf/	*'it did'*
	[k^{h}ʌɸ]	/xəf/	*'leaf'*
	[kxʌɸ]	/xəf/	*'leaf'*
	[xʌɸ]	/xəf/	*'leaf'*
set 3.	[ɸʊ'ɾuŋk^{h}]	/furug/	*'armband'*
	['aɾɨk^{h}]	/arɨx/	*'you leave - imp.'*
	['aɾɨ kx]	/arɨx/	*'you leave - imp.'*
	['aɾɨx]	/arɨx/	*'you leave - imp.'*
set 4.	['hagʌɸ]	/hagəf/	*'he has died'*
	['haɣʌɸ]	/haxəf/	*'it has rotted'*

/d/ and /j/

set 1.	[dʌ]	/də/	*'salt'*
	[dzʌ g-]	/jə g-/	*'to break'*
set 2.	[daŋ]	/daŋ/	*'across there'*
	['dzaŋdzoŋ]	/jaŋjoŋ/	*'bird sp.'*
set 3.	[an'dambin]	/adabin/	*'I am walking'*
	[aɲ'dzambin]	/ajabin/	*'I am mumuing'*
set 4.	[ham'badʌ]	/habadə/	*'kunai'*
	['dzadzʌ]	/jajə/	*'root'*
set 5.	['andə]	/adə/	*'above'*
	['maɲdzə]	/majə/	*'important'*
set 6.	[ɸʌnt^{h}]	/fəd/	*'yam'*
	[ɸʌɲtc]	/fəj/	*'singsing hat'*

/k/ and /h/

set 1.	[kʰaɲtc]	/xaj/	*'pig'*
	[haɲtc]	/haj/	*'spirit'*
set 2.	[kʰaŋ]	/kaŋ/	*'grub'*
	[haŋ]	/haŋ/	*'noise of water'*
set 3.	[kʰʌl]	/xəl/	*'you* - dual'
	[hel]	/hel/	*'trap'*
set 4.	['kʰale]	/kale/	*'you'*
	['hale]	/hale/	*'we'*
set 5.	[a'kʰai]	/axai/	*'pitpit sp.'*
	[a'kxai]	/axai/	*'pitpit sp.'*
	[a'xal]	/axal/	*'pitpit sp.'*
	[wʊ'hai]	/uhai/	*'tree sp.'*

/b/ and /m/

set 1.	[bʌŋ]	/bəŋ/	*'one side of'*
	[mʌŋ]	/məŋ/	*'rain'*
set 2.	[ba]	/ba/	*'steep slope'*
	[ma]	/ma/	*'foot'*
set 3.	[am'baɲ]	/abaɲ/	*'platform'*
	[a'maɲ]	/amaɲ/	*'mother's sister'*
set 4.	[kʰʊm'bi wʊnd-]	/xubi ud-/	*'to steal'*
	['kʰʊmi]	/xumi/	*'cloud'*
set 5.	[mampʰ]	/mab/	*'tree'*
	[mam]	/mam/	*'brother'*

/d/ and /n/

set 1.	[dʌ]	/də/	*'salt'*
	[nʌ]	/nə/	*'ridge'*
set 2.	[dai]	/dai/	*'sweet potato sp.'*
	['naiwʌʌ]	/naiwəʌ/	*'wife's sister'*
set 3.	['Φəndʌŋ]	/fədəŋ/	*'strong'*
	['mənʌŋ]	/mənəŋ/	*'ground'*
	['Φənəm]	/fənəm/	*'wind'*
set 4.	[an'dan]	/adan/	*'road'*
	['ana]	/ana/	*'shadow'*
set 5.	[antʰ]	/ad/	*'mine'*
	[an]	/an/	*'who'*
set 6.	['ɾ̲ɨmɨntʰ]	/rɨmɨd/	*'ear'*
	['ɾ̲ɨmɨn]	/rɨmɨn/	*'edible greens'*

/j/ and /ɲ/

set 1.	[dzʌl]	/jəl/	*'back'*
	[ɲʌl]	/ɲəl/	*'firewood'*

set 2.	[dzɪŋ]	/jiŋ/	*'upstream'*
	[ɲɪŋkʰ]	/ɲig/	*'water'*
set 3.	['aɲdzɨp]	/ajɨf/	*'bicep'*
	['aɲɨ]	/aɲɨ/	*'one'*
set 4.	['dzʊdzu]	/juju/	*'tired'*
	['kʰʊɲu]	/xuɲu/	*'sputum'*
set 5.	[haɲtc]	/haj/	*'spirit'*
	[haɲ]	/haɲ/	*'skin'*
set 6.	[aɲtc]	/aj/	*'sister-in-law'*
	[aɲ]	/aɲ/	*'sister'*

/g/ and /ŋ/

set 1.	[a'laŋgo]	/alago/	*'snake sp.'*
	[a'laŋʌ]	/alaŋə/	*'bread fruit'*
set 2.	['maŋgʌ]	/magə/	*'lump'*
	[gə'βaŋʌ]	/gəfaŋə/	*'tree sp.'*
set 3.	[ɸəŋ'gampʰ]	/fəgab/	*'it dries up'*
	[nəŋ'ampʰ]	/nəŋab/	*'he is seeing'*
set 4.	[u'maŋgə]	/umagə/	*'hair'*
	['waŋʌ]	/waŋə/	*'pool'*
set 5.	[mʌŋkʰ]	/məg/	*'sorrow'*
	[mʌŋ]	/məŋ/	*'rain'*
set 6.	[haŋkʰ]	/hag/	*'cucumber'*
	[aŋ]	/aŋ/	*'middle'*

/n/ and /ɲ/

set 1.	[nɨ]	/nɨ/	*'you sg.'*
	[ɲɨ]	/ɲɨ/	*'child'*
set 2.	['naŋgɨ]	/nagɨ/	*'rope'*
	['ɲaŋgɨl̩]	/ɲagɨl̩/	*'weak'*
set 3.	[an]	/an/	*'who'*
	[aɲ]	/aɲ/	*'sister'*
set 4.	[han]	/han/	*'you sleep - imp.'*
	[haɲ]	/haɲ/	*'skin'*
set 5.	[man]	/man/	*'louse'*
	[a'maɲ]	/amaɲ/	*'mother's sister'*

/n/ and /ŋ/

set 1.	['ana]	/ana/	*'shadow'*
	['aŋa g-]	/aŋa g-/	*'to make a noise'*
set 2.	['ɸənʌm]	/fənəm/	*'wind - noun'*
	[ɸəŋ'ʌn]	/fəŋən/	*'sweet potato sp.'*
set 3.	['ilʌn]	/ilən/	*'pain'*
	['ilʌŋ]	/iləŋ/	*'stick'*

set 4.	[dzɪn]	/jin/	*'tree sp.'*
	[dzɪŋ]	/jiŋ/	*'upstream'*
set 5.	[an]	/an/	*'who'*
	[aŋ]	/aŋ/	*'middle'*
set 6.	['haɭɨn]	/haɭɨn/	*'well grown'*
	['haɭɨŋ]	/haɭɨŋ/	*'smell'*

/ɲ/ and /ŋ/

set 1.	[mi'ɲai gʌΦ]	/miɲai gəf/	*'epidemic'*
	['aŋa gʌΦ]	/aŋa gəf/	*'it made a noise'*
set 2.	[aɲ]	/aɲ/	*'sister'*
	[aŋ]	/aŋ/	*'middle'*
set 3.	[bʌɲ]	/bəɲ/	*'underneath'*
	[bʌŋ]	/bəŋ/	*'one side of'*
set 4.	[am'baɲ]	/abaɲ/	*'platform'*
	['ambaŋ]	/abaŋ/	*'a river name'*
set 5.	[haŋgə'ɲaɲ]	/hagɲaɲ/	*'mosquito'*
	[gɨ'ɲaŋ]	/gɨɲaŋ/	*'let him shut'*
set 6.	[a'maɲ]	/amaɲ/	*'mother's sister'*
	[wa'maŋ]	/wa'maŋ/	*'let him bind'*

/f/ and /w/

set 1.	[Φʌntʰ]	/fəd/	*'yam'*
	[wʌŋkʰ]	/wəg/	*'garden'*
	[Φɨŋkʰ]	/fɨg/	*'with'*
set 2.	[Φen]	/fen/	*'debt'*
	[we]	/we/	*'blind'*
set 3.	[Φan]	/fan/	*'banana sucker'*
	['wanaŋ]	/wanaŋ/	*'eel'*
set 4.	[Φai]	/fai/	*'girl'*
	[wai]	/wai/	*'bamboo sp.'*
set 5.	[kʰai'βarʌm]	/xaifarəm/	*'weeds'*
	['naiwʌʎ]	/nalwəʎ/	*'wife's sister'*

/l/ and /ʎ/

set 1.	[a'lampʰ]	/alab/	*'he is shooting'*
	[a'ʎampʰ]	/aʎab/	*'tongue'*
set 2.	['halʌ]	/halə/	*'with'*
	['haʎɨ]	/haʎɨ/	*'edible leaves'*
set 3.	[a'laŋgo]	/alago/	*'snake sp.'*
	[a'ʎaŋgʌ]	/aʎagə/	*'tree sp.'*
set 4.	[mol]	/mol/	*'inside'*
	[moʎ]	/moʎ/	*'fat'*

/l/ and /ɭ/

set 1.	[a'laŋ]	/alaŋ/	*'let him shoot'*
	[a'ɭaŋ]	/aɭaŋ/	*'possum sp.'*
set 2.	[a'lamp^{h}]	/alab/	*'he is shooting'*
	[a'ɭant^{h}]	/aɭad/	*'horizon'*
set 3.	['walɨ]	/walɨ/	*'tree sp.'*
	['waɭɨ]	/waɭɨ/	*'river name'*
set 4.	['gʊlo]	/gulo/	*'worm'*
	['gʊɭo]	/guɭo/	*'river name'*
set 5.	['ambal]	/abal/	*'name of a river'*
	['yambaɭ]	/yabaɭ/	*'bird sp.'*
set 6.	[lel]	/lel/	*'quickly'*
	['ɭuʌɭ]	/ɭuəɭ/	*'horizontal timbers'*

/ɭ/ and /ʌ/

set 1.	[a'ɭant^{h}]	/aɭad/	*'horizon'*
	[a'ʌamp^{h}]	/aʌab/	*'tongue'*
set 2.	[a'ɭaŋ]	/aɭaŋ/	*'possum sp.'*
	[a'ʌaŋgʌ]	/aʌagə/	*'tree sp.'*
set 3.	['Φɨɭɨ g-]	/fɨɭɨ g-/	*'blocked'*
	['haʌɨ]	/haʌɨ/	*'edible leaves'*
set 4.	[wə'haɭɨn]	/wəhaɭɨn/	*'yellow'*
	[wə'haʌɨ]	/wəhaʌɨ/	*'bird sp.'*
set 5.	['yɪmbɨɭ]	/ibɨɭ/	*'very* - intensifier'
	[bɨʌ]	/bɨʌ/	*'sugar'*
set 6.	[moɭ]	/moɭ/	*'ditch'*
	[moʌ]	/moʌ/	*'fat'*

/l/ and /r/

set 1.	[le]	/le/	*'bone'*
	[ɾ̲e]	/re/	*'snake'*
set 2.	[lau'namp^{h}]	/launab/	*'he will cook'*
	[ɾau'namp^{h}]	/raunab/	*'he will buy'*
set 3.	[a'lambin]	/alabin/	*'I am shooting'*
	[a'ɾambɪn]	/arabin/	*'I am going'*
set 4.	['umbʌɬ]	/ubəl/	*'upstream'*
	['umbʌr̲]	/ubər/	*'saddle'*
set 5.	[Φəl]	/fəl/	*'you pull* - imp.'
	[Φʌɾ]	/fər/	*'always'*
set 6.	[ɾ̲ul g-]	/rul g-/	*'to fall down'*
	[wʊr̲]	/ur/	*'stick'*

/ɻ/ and /r/

set 1.	[ɻu'ambin]	/ɻuabin/	*'I am scooping'*
	[ɾu]	/ru/	*'axe'*
set 2.	['Φɨɻɨ gʌΦ]	/fɨɻɨ gəf/	*'it is blocked'*
	['Φɨɾɨ gʌΦ]	/fɨrɨ gəf/	*'it is black'*
set 3.	[a'ɻaŋ]	/aɻaŋ/	*'possum sp.'*
	[a'ɾaŋ]	/araŋ/	*'let him go'*
set 4.	[goɻ]	/goɻ/	*'joint'*
	[bor]	/bor/	*'fern sp.'*
set 5.	[hauɻ]	/hauɻ/	*'insane'*
	[ɣaur]	/ɣaur/	*'bird'*
set 6.	['ɣɪmbɨɻ]	/ibɨɻ/	*'very'*
	['umbʌr]	/ubər/	*'saddle'*

/w/ and /m/

set 1.	[wam]	/wam/	*'you bind'*
	[mam]	/mam/	*'brother'*
set 2.	[wʌŋk^{h}]	/wəg/	*'garden'*
	[mʌŋk^{h}]	/məg/	*'sorrow'*
set 3.	[wim]	/wim/	*'a bow'*
	['mimor]	/mimor/	*'Christmas beetle'*
set 4.	[a'wan]	/awan/	*'wing'*
	[a'maɲ]	/amaɲ/	*'mother's sister'*

/h/ and /r/

set 1.	[hol]	/hol/	*'we* - dual'
	[ɾol]	/rol/	*'tomorrow'*
set 2.	['haɣʌΦ]	/haxəf/	*'decayed-tooth'*
	['ɾaɣʌn]	/raxən/	*'moon'*
set 3.	[wʊ'hai]	/uhai/	*'tree sp.'*
	[u'ɾai]	/urai/	*'cockatoo'*

3.3.1.2. Suspect pairs of vowel phonemes contrasted. For examples of complementation see Section 3.3.2.2.

/i/ and /e/

set 1.	[sɪ]	/si/	*'wrongly'*
	[se]	/se/	*'full'*
set 2.	[au'i]	/aui/	*'here'*
	['aue]	/aue/	*'you come* - imp.'
set 3.	['k^{h}aβi]	/xafi/	*'pitpit sp.'*
	[be]	/be/	*'bush'*
set 4.	['k^{h}ʊmi]	/xumi/	*'cloud'*
	[wʊɻə'me]	/uɻme/	*'place name'*

set 5.	['nɪmbi]	/nibi/	*'woman'*
	['ambe]	/abe/	*'altogether'*

/e/ and /a/

set 1.	[be]	/be/	*'bush'*
	[ba]	/ba/	*'steep slope'*
set 2.	[k^he]	/xe/	'emphasising clitic'
	[k^ha]	/xa/	*'burial place'*
set 3.	[meŋk^h]	/meg/	*'tooth'*
	['maŋgʌ]	/magə/	*'lump'*
set 4.	[hel]	/hel/	*'trap'*
	['halʌ]	/halə/	*'more'*
set 5.	[Φen]	/fen/	*'debt'*
	[Φan]	/fan/	*'sucker'*

/a/ and /o/

set 1.	[ma]	/ma/	*'foot'*
	[mo]	/mo/	*'underneath'*
set 2.	[Φa]	/fa/	*'you strike* - imp.'
	[Φo]	/fo/	*'ripening'*
set 3.	['ana]	/ana/	*'shadow'*
	[no]	/no/	*'ridge'*
set 4.	[r̲al]	/ral/	*'you gather* - imp.'
	[r̲ol]	/rol/	*'tomorrow'*
set 5.	[han]	/han/	*'you sleep* - imp.'
	[hon]	/hon/	*'we'*

/o/ and /u/

set 1.	[ɾo]	/ro/	*'dividing mark across garden'*
	[ɾu]	/ru/	*'axe'*
set 2.	[mo]	/mo/	*'underneath'*
	[mu]	/mu/	*'blue'*
set 3.	[aŋ'galo]	/agalo/	*'part in front of ear'*
	[k^həŋ'galu]	/xəgalu/	*'spider'*
set 4.	['Φaɻo]	/faɻo/	*'sugar sp.'*
	['Φaɻu]	/faɻu/	*'cover'*
set 5.	['maroɬ]	/marol/	*'place name'*
	['maɻʊɻ]	/maɻuɻ/	*'vine sp.'*

/u/ and /ɨ/

set 1.	[mu]	/mu/	*'blue'*
	[mɨ][mɯ]	/mɨ/	*'taro'*
set 2.	[bu]	/bu/	*'tree sp.'*
	[bɨ][bɯ]	/bɨ/	*'man'*

set 3.	['kʰaɻu]	/xaɻu/	*'pitpit sp.'*
	['kʰaɻɨ]	/xaɻɨ/	*'tree sp.'*
set 4.	['gabu]	/gabu/	*'bamboo harp'*
	['gaβɨ]['gaβɯ]	/gafɨ/	*'star'*

/ɨ/ and /i/

set 1.	['gaβɨ]['gaβɯ]	/gafɨ/	*'star'*
	['kʰaβi]	/xafi/	*'pitpit sp.'*
set 2.	[mɨ][mɯ]	/mɨ/	*'taro'*
	['kʰʊmi]	/kumi/	*'cloud'*
set 3.	[ɸɨɾɨ]	/fɨrɨ/	*'black'*
	['wʊri]	/uri/	*'now'*
set 4.	[bɨ][bɯ]	/bɨ/	*'man'*
	['aubi]	/aubi/	*'nephew and father's sister together'*
set 5.	[nɨɸ]	/nɨf/	*'him* - obj.'
	[kʰɨn'diɸ]	/xədif/	*'landslide'*
set 6.	['baβɨ]['baβɯ]	/bafɨ/	*'father'*
	['haləβi]	/halfl/	*'play'*
set 7.	[kʰɨn dzu-]	/xɨn ju-/	*'to remove ground'*
	[kʰin]	/xin/	*'fern sp.'*

/ɨ/ and /ɸ/

set 1.	[wal]	/wal/	*'possum'*
	[walɨ]	/walɨ/	*'tree sp.'*
set 2.	[aɲ]	/aɲ/	*'sister'*
	['aɲɨ]	/aɲɨ/	*'one'*
set 3.	[kal]	/kal/	*'angry'*
	['kalɨ]	/kalɨ/	*'thorn'*

/ə/ and /i/

set 1.	[a'ɾambʌn]	/arabən/	*'you are going'*
	[a'ɾambin]	/arabin/	*'I am going'*
set 2.	['kʰambʌ]	/xabə/	*'stone'*
	['sambi]	/sabl/	*'pitpit sp.'*
set 3.	[mɐn'dʌɸ]	/mədəf/	*'it is'*
	[kʰɐn'diɸ]	/xədif/	*'landslide'*
set 4.	[ɸʌ]	/fə/	*'arrow'*
	[ɸi]	/fi/	*'offspring'*
set 5.	[ɸʌntʰ]	/fəd/	*'yam'*
	[ɸintʰ]	/fid/	*'banana'*
set 6.	[sʌmpʰ]	/səb/	*'nettle'*
	[sɪmpʰ]	/sib/	*'darkness'*

/ə/ and /e/

set 1.	[ɾ̲ʌ]	/rə/	'clitic - *like*'
	[ɾ̲e]	/re/	*'snake'*
set 2.	[bʌ]	/bə/	'clitic - *with*'
	[be]	/be/	*'bush'*
set 3.	[mʌŋk^{h}]	/məg/	*'mourn'*
	[meŋk^{h}]	/meg/	*'tooth'*
set 4.	[ɸənt^{h}]	/fəd/	*'yam'*
	[ɸen]	/fen/	*'debt'*
set 5.	['wasʌ]	/wasə/	*'no'*
	['wʊse]	/use/	*'sore'*
set 6.	[a'l̩aβʌ]	/al̩afə/	*'tree sp.'*
	[u'ɾaβe]	/urafe/	*'bird sp.'*

/ə/ and /a/

set 1.	[bʌŋ]	/bəŋ/	*'one side of'*
	[baŋ]	/baŋ/	*'frog'*
set 2.	[u'mʌmp]	/uməb/	*'he died'*
	[u'mamp^{h}]	/umab/	*'he is dying'*
set 3.	[mɬn'dʌɸ]	/mədəf/	*'there is'*
	[mɬn'daɸ]	/mədaf/	*'cousin'*
set 4.	['ɸəndʌŋ]	/fədəŋ/	*'strong'*
	['ɸandʌ]	/fadə/	*'house post'*
set 5.	['mənʌŋ]	/mənəŋ/	*'ground'*
	['mənaŋ]	/mənaŋ/	*'edible greens'*
set 6.	[k^{h}u'ʌm]	/xuəm/	*'crocodile'*
	[k^{h}u'am]	/xuam/	*'tree sp.'*
set 7.	['yuʌ]	/yuə/	*'meat'*
	['yua]	/yua/	*'bird sp.'*

/ə/ and /o/

set 1.	[gʌɸ]	/gəf/	*'it does'*
	[goɸ]	/gof/	*'handle'*
set 2.	['halʌ]	/halə/	'clitic - *with*'
	['halo]	/halo/	*'bird sp.'*
set 3.	[sʌl]	/səl/	*'nearby'*
	[sol̩]	/sol̩/	*'banana sp.'*
set 4.	[dʌ]	/də/	*'salt'*
	['bado]	/bado/	*'men married to sisters'*
set 5.	['aunə]	/aunə/	*'I came'*
	['auno]	/auno/	*'we came'*

/ə/ and /u/

set 1.	[wʌs]	/wəs/	*'sore'*
	[wʊs]	/us/	*'bark hat'*
set 2.	['ambʌ g-]	/abə g-/	*'to tread on'*
	['ambu g-]	/abu g-/	*'to leave in mumu overnight'*
set 3.	[bʌ]	/bə/	'clitic - *with*'
	[bu]	/bu/	*'tree sp.'*
set 4.	[sʌmp^{h}]	/səb/	*'nettle'*
	[sump^{h}]	/sub/	*'bird sp.'*
set 5.	[a'ɾambəl]	/arabəl/	*'they go'*
	[a'ɾambʊl]	/arabul/	*'we go'*

/ə/ and /ɨ/

set 1.	[mʌŋ]	/məŋ/	*'rain'*
	[mɨŋ]	/mɨŋ/	*'downstream'*
set 2.	[bʌŋ]	/bəŋ/	*'one side of'*
	[bɨŋ]	/bɨŋ/	*'strongly'*
set 3.	[bʌ]	/bə/	'clitic - *with*'
	[bɨ][bɯ]	/bɨ/	*'man'*
set 4.	[nʌɸ]	/nəf/	*'you'*
	[nɨɸ]	/nɨf/	*'him'*
set 5.	['ɾ̲ɨmʌn]	/rɨmən/	*'waist-cane'*
	['ɾ̲ɨmɨn]	/rɨmɨn/	*'edible greens'*
set 6.	['ɾ̲amʌ]	/ramə/	*'river junction'*
	[mɨ]	/mɨ/	*'taro'*

/ə/ and /ɸ/

set 1.	[ain]	/ain/	*'lower side'*
	['aiʌn]	/aiən/	*'witch'*
set 2.	[bu]	/bu/	*'explosion'*
	['bu.ə]	/buə/	*'father's brother'*
set 3.	[maɲtc]	/maj/	*'kaukau'*
	['maɲdə]	/majə/	*'big'*
set 4.	[ɾ̲am]	/ram/	*'house'*
	['ɾ̲amʌ]	/ramə/	*'fork in river'*
set 5.	[ɾ̲u]	/ru/	*'axe'*
	[ɾ̲u.ə]	/ruə/	*'day after tomorrow'*

/h/ and /ɸ/

set 1.	[haŋ]	/haŋ/	*'noise'*
	[aŋ]	/aŋ/	*'middle'*
set 2.	[hintc]	/hij/	*'smell'*
	[intc]	/ij/	*'finger nail'*

3.3.2. Description of Phonemes

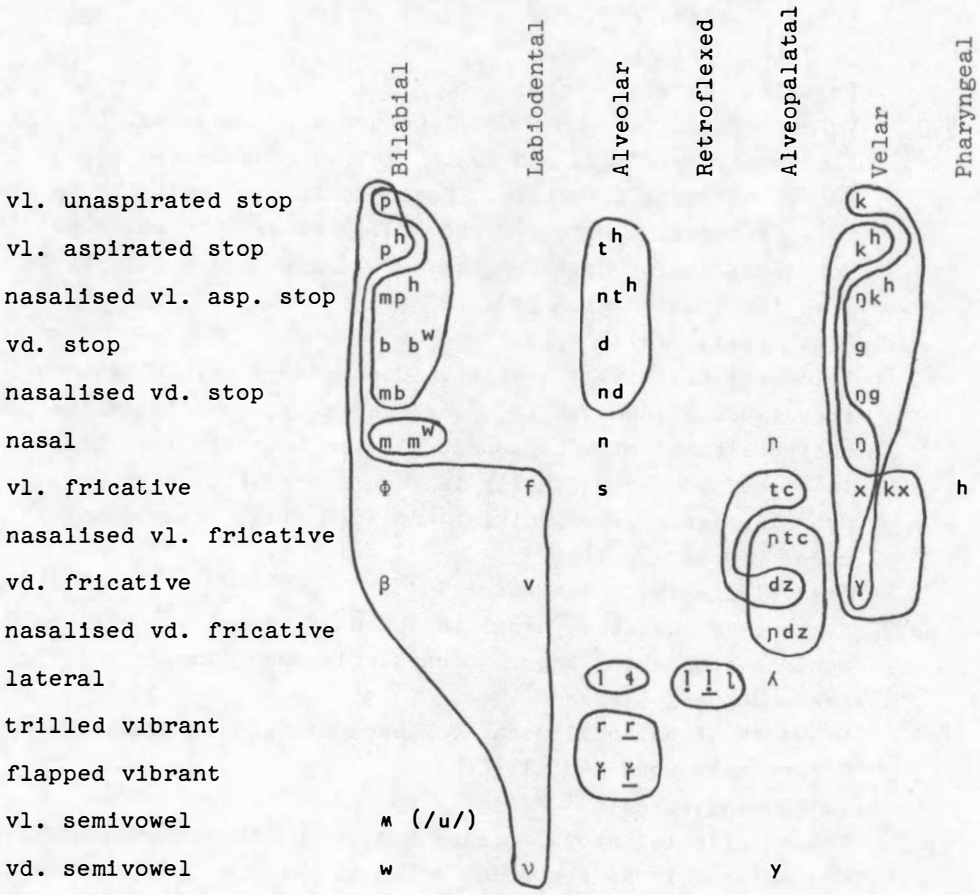
All sounds are produced with egressive lung air.

3.3.2.1. *Description of Consonant Phonemes*

Sounds which are circled together in Chart 6 are allophones of the same phoneme.

CHART 6

ALLOPHONES OF CONSONANTAL PHONEMES



Phoneme Allophone Description and Occurrence with Examples:

/f/ [p] Voiceless unreleased bilabial stop. Occurs word finally in free fluctuation with [ɸ].
[gʌp] [gəɸ] /gəf/ *'it does'*

[p^h] Voiceless aspirated bilabial stop. Only one occurrence recorded.
['aɾəp^h] /arəf/ *'he went'*

[v] Voiced labiodental fricative. Occurs only word medially in free fluctuation with [β] and [ʋ].
[a'valʌ] /afalə/ *'jaw'*
[a'βalʌ] /afalə/ *'jaw'*
[a'ʋalʌ] /afalə/ *'jaw'*

[ʋ] Voiced labiodental semivowel. Occurs only word medially in fluctuation with [β] and [v]. See examples under [v].

[β] Voiced bilabial fricative. Occurs only word medially in free fluctuation with [v] and [ʋ]. See example under [v].

[f] Voiceless labiodental fricative. Occurs word initially in free fluctuation with [ɸ].
[fai] [ɸai] /fai/ *'girl'*

[ɸ] Voiceless bilabial fricative. Occurs word initially in free fluctuation with [f], word medially when /f/ is the second element of a consonant cluster in which transition is close, and word finally in free fluctuation with [p]. See examples of word initial and word final occurrence under [f] and [p].
['amɸel] /amfel/ *'immediately'*

/b/ [mp^h] Sequence of bilabial nasal followed by voiceless, lightly aspirated bilabial stop. Occurs only word finally.
[mamp^h] /mab/ *'tree'*

[mb] Sequence of bilabial nasal followed by voiced bilabial stop. Occurs only word medially.
[a'ɾambin] /arabin/ *'I am going'*

[b] Voiced bilabial stop. Occurs morpheme initially, word medially following a lenis obstruent or nasal phoneme in the preceding syllable, word medially when /b/ is the second consonantal element of a consonant cluster, and occasionally word medially following /h/ initially in the preceding syllable in fluctuation with [mb].
[bom] /bom/ *'honey'*
[yu'bin] /yubin/ *'I threw'*
[nəŋ'bin] /nəŋbin/ *'I see'*

['gaubu] /gaubu/ *'bamboo harp'*
[ha'badʌ] /habadə/ *'kunai'*
[ham'badʌ] /habadə/ *'kunai'*

[p] Voiceless bilabial stop. Occurs occasionally word initially in fluctuation with [b].
[pagʌ] [bagʌ] /bagə/ *'sign'*
Some speakers have a tendency to labialise /b/ before a central or back vowel which is high or mid (see Section 3.2.3.2.).

/s/ [s] Voiceless alveolar grooved fricative. Occurs in all positions in the word.
[sai] /sai/ *'skirt'*
[gɪ'sʌn] /gisən/ *'new'*
[as] /as/ *'frog'*

/d/ [nt^{h}] Sequence of alveolar nasal followed by voiceless, lightly aspirated alveolar stop. Only occurs word finally.
[yant^{h}] /yad/ *'I'*

[nd] Sequence of alveolar nasal followed by voiced alveolar stop. Occurs only word medially.
[an'dan] /adan/ *'road'*

[d] Voiced alveolar stop. Occurs only word initially, word medially following a lenis obstruent or nasal phoneme in the preceding syllable, and word medially where /d/ is the second consonantal element of a consonant cluster in fluctuation with [nd].
[dum] /dum/ *'mountain'*
['bado] /bado/ *'men married to sisters'*
['mamdu] /mamdu/ *'thumb'*
['mamәndu] /mamdu/ *'thumb'*

[t^{h}] Voiceless lightly aspirated alveolar stop. Occurs very occasionally word finally following a lenis obstruent phoneme in the preceding syllable in fluctuation with [nt^{h}].
[bit^{h}] [bint^{h}] /bid/ *'wall'*

/c/ [tc] Homorganic affricate comprising voiceless alveopalatal stop followed by voiceless alveopalatal grooved fricative. Occurs in all positions in the word.
[tci] /ci/ *'milk'*
['tcatcal gʌΦ] /cacal gəf/ *'broken into pieces'*
[batc] /bac/ *'grandfather'*

[dz] Homorganic affricate comprising voiced alveopalatal stop followed by voiced alveopalatal grooved fricative. Occurs

word medially in fluctuation with [tc].
['tcadzɪŋ] /caciŋ/ *'drum'*
['tcatcɪŋ] /caciŋ/ *'drum'*

/j/ [ɲtc] Sequence of alveopalatal nasal followed by homorganic affricate comprising voiceless alveopalatal stop followed by voiceless alveopalatal grooved fricative. Occurs only word finally.
[k^{h}aɲtc] /xaj/ *'pig'*

[ɲdz] Sequence of alveopalatal nasal followed by homorganic affricate comprising voiced alveopalatal stop followed by voiced alveopalatal grooved fricative. Occurs only word medially.
[aɲ'dzamp^{h}] /ajab/ *'he is walking'*

[dz] Homorganic affricate comprising voiced alveopalatal stop followed by voiced alveopalatal grooved fricative. Occurs word initially, word medially following a lenis obstruent or nasal phoneme in the preceding syllable, and word medially where /j/ is the second element of a consonant cluster.
['dzʊdzu gʌΦ] /juju gəf/ *'tired'*
['dzadzɪl] /jajil/ *'imitate'*
['dzaŋdzoŋ] /jaŋjoŋ/ *'bird sp.'*
For a discussion of the overlap between /c/ and /j/ see Section 3.2.3.4.

/x/ [x] Voiceless velar fricative. Occurs in all positions in the word in fluctuation with [k^{h}] and [kx].
['xambʌ] /xaba/ *'stone'*
['k^{h}ambʌ] /xabə/ *'stone'*
['kxambʌ] /xabə/ *'stone'*
[a'xai] /axai/ *'pitpit'*
[a'k^{h}ai] /axai/ *'pitpit'*
[a'kxai] /axai/ *'pitpit'*
[yɪx] /ix/ *'down there'*
[yɪk^{h}] /ix/ *'down there'*
[yɪkx] /ix/ *'down there'*

[kx] Voiceless velar affricate comprising voiceless velar stop followed by voiceless velar fricative. Occurs in all positions of the word in fluctuation with [x] and [k^{h}]. See example under [x].

[k^{h}] Voiceless aspirated velar stop. Occurs in all positions in the word in fluctuation with [x] and [kx]. See example under [x].

[ɣ] Voiced velar fricative. Occurs word medially fluctuation with [x] [kx] and [k^h].
[sʊ'ɣump^h] /sukub/ *'bird sp.'*
[sʊ'k^{h}ump^h] /sukub/ *'bird sp.'*

/g/ [ŋk^h] Sequence of velar nasal followed by voiceless, lightly aspirated velar stop. Occurs only word finally.
[wʌŋk^h] /wəg/ *'garden'*

[ɣ] Voiced velar fricative. Occurs only intervocalically in fluctuation with [g].
['gɨɣɨɣ̞] ['gɨgɨɣ̞] /gɨgɨr/ *'corn'*

[ŋg] Sequence of velar nasal followed by voiced velar stop. Occurs only word medially.
['tcaŋge] /cage/ *'tobacco'*

[g] Voiced velar stop. Occurs word initially in fluctuation with [k], word medially following a lenis obstruent or nasal phoneme in the preceding syllable in fluctuation with [ɣ], and word medially where /g/ is the second consonantal element of a consonant cluster, in fluctuation with [ŋg].

[kɨs] [gɨs]	/gɨs/	*'brown'*
[ʌɪɸ kɨ] [ʌɪɸ gɨ]	/ʌif gɨ/	*'you pull* - imp.'
['gɨgɨr]	/gɨgɨr/	*'corn'*
['gɨɣɨr]	/gɨgɨr/	*'corn'*
['bagʌ]	/bagə/	*'sign'*
['baɣʌ]	/bagə/	*'sign'*
['amgʌ]	/amgə/	*'eye'*
['aməŋgʌ]	/amgə/	*'eye'*

[k] Voiceless unaspirated velar stop. Occurs only word initially in fluctuation with [g]. See examples under [g]. For a discussion of the overlap between /x/ and /g/ see Section 3.2.3.4.

/m/ [m] Voiced bilabial nasal. Occurs in all positions in the word.
[mam] /mam/ *'brother'*
['amɨ] /amɨ/ *'mother'*
Some speakers have a tendency to labialise /m/ before a central or back vowel which is high or mid (see Section 3.2.3.2.).

/n/ [n] Voiced alveolar nasal. Occurs in all positions in the word.
[nan] /nan/ *'thing'*
['ana] /ana/ *'shadow'*

/ɲ/ [ɲ] Voiced alveopalatal nasal. Occurs in all positions in the word.
[ɲʌmph] /ɲəb/ *'he gave'*
['aɲɨ] /aɲɨ/ *'one'*
[aɲ] /aɲ/ *'sister'*

/ŋ/ [ŋ] Voiced velar nasal. Occurs medially and finally in the word.
['waŋʌ] /waŋə/ *'pond'*
[mʌŋ] /məŋ/ *'rain'*

/h/ [h] Voiceless pharyngeal flat fricative. Occurs word initially and medially.
[hel] /hel/ *'trap'*
[wə'haʌɨ] /wəhaʌɨ/ *'bird sp.'*

/l/ [ɬ] Voiceless alveolar lateral fricative. Occurs word finally in free fluctuation with [l].
[waɬ] [wal] /wal/ *'possum'*

[l] Voiced alveolar lateral. Occurs in all positions in the word, and when occurring word finally tends to voicelessness and is in free fluctuation with [ɬ]. See example of word final occurrence under [ɬ].
[lel] /lel/ *'quickly'*
[a'lamp^{h}] /alab/ *'he is shooting'*

/ʎ/ [ʎ] Voiced alveopalatal lateral occurs in all positions in the word, tending to voicelessness when occurring word finally.
[ʎɪɸ gɨ] /ʎif gɨ/ *'you pull* -imp.'
['aʎɨ] /aʎɨ/ *'red'*
[bɨʎ] /bɨʎ/ *'sugar'*

/ɭ/ [ɭ̲] Voiceless retroflexed flapped lateral. Occurs word finally in fluctuation with [ɭ] and [l].
[hauɭ̲] [hauɭ] /hauɭ/ *'insane'*

[ɻ] Voiceless retroflexed lateral. Occurs word finally in fluctuation with [ɭ̲] and [ɭ].

[ɭ] Voiced retroflexed flapped lateral. Occurs in all positions in the word, and when occurring word finally tends to voicelessness and is in free fluctuation with [ɭ̲] and [ɻ].
['ɭuʌɭ] ['ɭuʌɭ̲] /ɭuəɭ/ *'horizontal timber'*
[a'ɭaŋ] /aɭaŋ/ *'possum sp.'*

/r/ [ɾ̲] Voiceless alveolar flapped vibrant with variable friction. Occurs word initially and word finally in fluctuation with [ɾ], [r̲], and [r].
[ɾam] /ram/ *'house'*

[yau̲r] /yaur/ *'bird'*
[yau̲ɾ̲] /yaur/ *'bird'*
[yaur] /yaur/ *'bird'*
[yauɾ̲] /yaur/ *'bird'*

[r̲] Voiceless alveolar trilled vibrant with variable friction. Occurs only word finally in fluctuation with [ɾ̲], [r], and [ɾ]. See example under [ɾ̲].

[r] Voiced alveolar trilled vibrant. Occurs word medially in fluctuation with [ɾ] and word finally in fluctuation with [r̲], [ɾ], and [ɾ̲]. See example of word final occurrence under [ɾ̲].

[a'ramp^{h}] /arab/ *'he is going'*
[a'ɾamp^{h}] /arab/ *'he is going'*

[ɾ] Voiced alveolar flapped vibrant. Occurs word medially in fluctuation with [r] and word finally in fluctuation with [ɾ̲], [r̲], and [r]. See example of word medial occurrence under [r], and of word final occurrence under [ɾ̲].

/w/ [w] Voiced bilabial semivowel. Occurs word initially and medially.

[wʌŋk^{h}] /wəg/ *'garden'*
['naiwʌʌ] /naiwəʌ/ *'wife's sister'*
['anwʌl məhau] /anwəl məhau/ *'two wives of one man'*

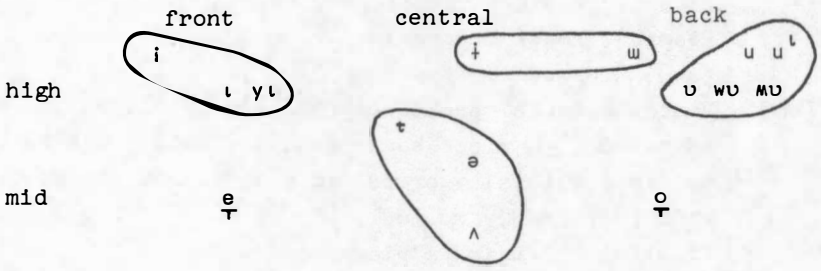
/y/ [y] Voiced palatal semivowel. Occurs word initially and medially.

[yant^{h}] /yad/ *'I'*
['k^{h}ayaŋ] /kayaŋ/ *'again'*

3.3.2.2. *Description of Vocalic Phonemes*

Chart 7

ALLOPHONES OF VOCALIC PHONEMES



Phoneme Allophone Description and Occurrences with Examples:

/i/ [yɪ] Voiced palatal semivowel followed by voiced lowered and retracted high close front unrounded vocoid. Occurs word initially in fluctuation with [i].

[yɪn'dam] /idam/ *'parrot'*

[in'dam] /idam/ *'parrot'*

[ɪ] Voiced lowered and retracted high close front unrounded vocoid. Occurs word medially and finally adjacent to an alveopalatal consonant, /s/, or /n/.

[tcɪ gʌɸ] /ci gəf/ *'stuck'*

['dzɪmdzɪm ɲ-] /jimjim ɲ-/ *'to join'*

[ɲɪ ɸəro] /ɲi fro/ *'child'*

[ʌɪɸ gɨ] /ʌif gɨ/ *'you pull - imp.'*

[sɪmp^{h}] /sib/ *'darkness'*

['aβsɪl] /afsil/ *'child with grandmother'*

['nɪmbi] /nibi/ *'woman'*

[i] Voiced high close front unrounded vocoid. Occurs in all positions in the word.

['iru] /iru/ *'plenty'*

[ɸint^{h}] /fid/ *'banana'*

[ɸi] /fi/ *'offspring'*

/e/ [e̞] Voiced lowered mid-close front unrounded vocoid. Occurs in all positions in the word.

[e̞ gʌɸ] /e gəf/ *'he said'*

[he̞l] /hel/ *'trap'*

['ɾ̞ale̞mp^{h}] /raleb/ *'eight'*

['wʊse̞] /use/ *'sore'*

Elsewhere in this paper [e̞] is symbolised as [e].

/a/ [a] Voiced low open front spread vocoid. Occurs in all positions in the word.

['agɨtc] /agɨc/ *'sweet pot. sp.'*

[mamp^{h}] /mab/ *'tree'*

[ma] /ma/ *'foot'*

/u/ [wʊ] Voiced bilabial semivowel followed by voiced lowered and advanced high close back rounded vocoid. Occurs word and syllable initially preceding a consonant, in fluctuation with [u], [ʍʊ], and [ʊ].

['wʊu̟im] /uu̟im/ *'place name'*

['uu̟im] /uu̟im/ *'place name'*

['ʍʊu̟im] /uu̟im/ *'place name'*

['ba.wʊnt^{h}] /baud/ *'tapioca'*

['ba.ʊnt^{h}] /baud/ *'tapioca'*

[ʍʊ] Voiceless bilabial semivowel followed by voiced lowered and advanced high close back rounded vocoid. Occurs occasionally word initially preceding a consonant in fluctuation with [u] and [wʊ]. See examples under [wʊ].

[u] Voiced high close back rounded vocoid. Occurs word initially in fluctuation with [wʊ] and [ʍʊ], word finally, and word medially preceding a vowel and in monosyllabic words. See example of word initial occurrence under [wʊ].

[mu] /mu/ *'blue'*
['l̪u.ʌl̪] /l̪uəl̪/ *'horizontal timbers'*
['dau.ʊmp^{h}] /dauub/ *'he brought'*
[k^{h}ump^{h}] /xub/ *'big'*

[ʊ] Voiced lowered and advanced high close back rounded vocoid. Occurs word medially only in mutually exclusive distribution with [u].

['mʊlu] /mulu/ *'nose'*

[u^{l}] Voiced high close back rounded vocoid with voiced lowered and retracted high close front unrounded vocoid offglide. Occurs preceding alveopalatal consonants.

[k^{h}u^{l}ɲtc] /xuj/ *'poison'*
[k^{h}u^{l}ʎ] /xuʎ/ *'thigh'*
[du^{l}ɲ] /duɲ/ *'bird sp.'*

/o/ [o̞] Voiced lowered mid-close back rounded vocoid. Occurs word medially and finally.

['mʊmo̞n] /mumon/ *'earthquake'*
[ɸə'ro̞] /fro/ *'small'*

Elsewhere in this paper [o̞] is symbolised as [o].

/ɨ/ [ɯ] Voiced high close back spread vocoid. Occurs word finally in fluctuation with [ɨ] and word medially adjacent to velars in fluctuation with [ɨ].

[bɯ] [bɨ] /bɨ/ *'man'*
['gɯgɯr̲] /gɨgɨr/ *'corn'*
['gɨgɨr̲] /gɨgɨr/ *'corn'*

[ɨ] Voiced high close central spread vocoid. Occurs word medially (when adjacent to velars in fluctuation with [ɯ]) and word finally in fluctuation with [ɯ]. See example of occurrence word medially adjacent to a velar under [ɯ].

[nɨɸ] /nɨf/ *'him* - obj.'
[mɨ] [mɯ] /mɨ/ *'taro'*

/ə/ [ɤ] Voiced raised and advanced mid-close central spread vocoid. Occurs word medially adjacent to an alveopalatal or alveolar consonant.

[mɤ'dzagʌ] /məjagə/ *'kunai'*

[k^hɤn'diΦ] /xədif/ *'landslide'*

[ʌ] Voiced mid-open central spread vocoid. Occurs medially and finally in the final syllable of the word in fluctuation with [ə] and in monosyllabic words.

['aiʌn] /aiən/ *'witch'*

['aɲdzʌl] /ajəl/ *'bird arrow'*

[a'βalʌ] [a'βalə] /afalə/ *'jaw'*

[wʌŋk^h] /wəg/ *'garden'*

[ə̹] Voiced mid-close central spread vocoid. Occurs medially and finally in the word, and when occurring word finally is in fluctuation with [ʌ]. See example of word final occurrence under [ʌ].

['Φə̹ndʌŋ] /fədəŋ/ *'strong'*

['maβə̹ː] /mafə̹/ *'well* - adv.'

Elsewhere in this paper [ə̹] is symbolised as [ə].

3.4. *THE SYLLABLE*

In order to facilitate the statement of the distribution of the phonemes, some tentative remarks about the structure and distribution of the syllable are made here. Pike has always stressed the importance of the syllable as a phonological unit. Comparatively recently Hoard (1971) and others working in natural generative phonology have claimed that the syllable is a more appropriate unit for a statement of phonological rules than the morpheme, and that certain significant generalisations can only be made if the syllable is recognised as a phonological unit.

3.4.1. The Structure of the Syllable

The syllable is a unit of potential stress placement and its nucleus is usually simple, consisting of only one vowel phoneme, but complex nuclei, /au/ and /ai/, occur. The syllable may optionally have a consonant onset or closure or both. Consonant closure and non-word-initial consonant onset are always single consonants. Very occasionally the word initial consonant onset may be a sequence of two consonants, but where this occurs the nucleus is always simple. Thus a syllable consists of one to four phonemes, at least one of which must be a vowel. For non-suspect consonant vowel patterns within the syllable with examples

see Section 3.2.1. The following types of syllable occur:

V CV VC CVC CCV CVV VVC CCVC CVVC VV

Where consonant clusters function as the prenuclear margin of the syllable a short nonphonemic schwa tends to occur between the two consonants.

[ɸə'ɾo] /fro/ *'small'*
[ɸə'ɾaɲtc] /fraj/ *'young'*

3.4.2. Syllable Distribution in the Word

Chart 8 shows the distribution of syllable types within the word. For non-suspect consonant-vowel patterns within the word see Section 3.2.1. (x) on Chart 8 means the syllable type only occurs as a word.

CHART 8

DISTRIBUTION OF SYLLABLE TYPES WITHIN THE WORD

	Word Initial	Word Medial	Word Final
V	x		x
CV	x	x	x
VC	x	x	x
CVC	x	x	x
CCV	(x)		
CVV	x	x	x
VVC	(x)		
CCVC	(x)		
CVVC	x		x
VV	x		x

All syllable types can be initial in the word.

V	[u'maŋgʌ]	/umagə/	*'hair'*
CV	['bɨɻɨmə]	/bɨɻɨmə/	*'place name'*
VC	['amgʌ]	/amgə/	*'eye'*
CVC	[ɲɪŋ'amp^{h}]	/ɲiŋab/	*'he eats'*
CCV	[ɸə'ɾo]	/fro/	*'small'*
CVV	['waimant^{h}]	/waimad/	*'flying fox'*
VVC	[ain]	/ain/	*'area near house'*
CCVC	[ɸə'ɾantc]	/fraj/	*'young'*
CVVC	[k^{h}ain]	/xain/	*'dog'*
VV	['aigege]	/aigege/	*'how many?'*

Three syllable types may occur word medially, CV, CVC, and CVV.

CV	[ambə'namə]	/abnamə/	*'freely'*
CVC	[halɲɪŋ'amp^{h}]	/halɲiŋab/	*'it eats'*
CVV	[wʊhai'amp^{h}]	/uhaiab/	*'he laughs'*

All syllable types except CCV, VVC, and CCVC may occur word finally.

V	['aue]	/aue/	*'you come* - imp.'
CV	[ambə'namʌ]	/abnamə/	*'freely'*
VC	[ɻu'ʌɻ]	/ɻuəɻ/	*'horizontal timbers'*
CVC	['nambin]	/nabin/	*'your wife'*
CVV	[a'k^{h}ai]	/axai/	*'pitpit sp.'*
CVVC	[wʊs'gain]	/usgain/	*'bird sp.'*
VV	[au'ai]	/auai/	*'where'*

The co-occurrence of syllable types in the phonological word is shown in Chart 9.

CHART 9

CO-OCCURRENCE OF SYLLABLE TYPES IN PHONOLOGICAL WORDS

An x means that the syllable type above it may follow the syllable type to its left.

	V	CV	VC	CVC	CCV	CVV	VVC	CCVC	CVVC	VV
V		x		x		x				
CV	x	x	x	x		x				
VC		x		x						
CVC			x	x						
CCV										
CVV		x	x	x						
VVC										
CCVC										
CVVC										
VV	x	x	x	x						x

Thus CCV, VVC, CCVC, and CVVC syllables may not be preceded or followed by another syllable. The only syllable type which may be followed by another syllable of the same type in a word are CV, VC, and CVC. CV and VC occur up to three times consecutively and CVC twice consecutively.

There follow examples of combinations of the syllable types in the phonological word corresponding to the x on Chart 8 reading from left to right across.

V.CV	['ana]	/ana/	*'shadow'*
V.CVC	[a'ɾ̆amp^{h}]	/arab/	*'he goes'*
V.CVV	[a'k^{h}ai]	/axai/	*'pitpit sp.'*
CV.V	['yuʌ]	/yuə/	*'flesh'*
CV.CV	['bado]	/bado/	*'men married to sisters'*
CV.VC	['l̥uʌl̥]	/l̥uəl̥/	*'horizontal timbers'*
CV.CVC	[gɨ'namp^{h}]	/gɨnab/	*'he will do'*
CV.CVV	[mə'hau]	/məhau/	*'two'*
VC.CV	['amgʌ]	/amgə/	*'eye'*
VC.CVC	['aŋnɨs]	/aŋnɨs/	*'tree sp.'*
CVC.VC	[nəŋ'amp^{h}]	/nəŋab/	*'he sees'*
CVC.CVC	[ɾ̆ɨm'ɲamp^{h}]	/rɨmɲab/	*'he tightens'*
CVV.CV	['hainʌ]	/hainə/	*'later'*
CVV.VC	[dau'amp^{h}]	/dauab/	*'he brings'*
CVV.CVC	['waimant^{h}]	/waimad/	*'flying fox'*
VV.V	['aue]	/aue/	*'you come* - imp.*'*
VV.CV	['aigege]	/aigege/	*'how many?'*
VV.VC	[au'amp^{h}]	/auab/	*'he comes'*
VV.CVC	['aigʌɸ]	/aigəf/	*'how?'*
VV.VV	[au'ai]	/auai/	*'here'*

3.5. *DISTRIBUTION OF PHONEMES*

The distribution of phonemes is stated in terms of the syllable and the phonological word.

3.5.1. Single Consonants

INITIAL. All consonants except /ŋ/ occur initially in the syllable and the word.

/f/	[ɸai]	/fai/	*'girl'*
/s/	[sʌmp^{h}]	/səb/	*'stinging nettle'*
/c/	['tcatcɪŋ]	/cacɪŋ/	*'drum'*
/x/	[k^{h}ump^{h}]	/xub/	*'big'*
/b/	[bom]	/bom/	*'honey'*
/d/	[dʊdʊ'badu]	/dudubadu/	*'crooked'*
/j/	['dzʊdzu]	/juju/	*'sleepy'*
/g/	['gabu]	/gabu/	*'bamboo'*
/m/	[mam]	/mam/	*'brother'*
/n/	[no]	/no/	*'mountain'*
/ɲ/	[ɲʌl]	/ɲəl/	*'firewood'*
/h/	[hel]	/hel/	*'trap'*
/l/	[lel]	/lel/	*'quickly'*

/ʌ/	[ʌɪɸ gɨ]	/ʌif gɨ/	*'you pull - imp.'*
/l̥/	['l̥uʌl̥]	/l̥uəl̥/	*'horizontal timbers'*
/r/	[r̥am]	/ram/	*'house'*
/w/	[wim]	/wim/	*'bow'*
/y/	[yaur]	/yaur/	*'bird'*

MEDIAL. No consonant can occur medially in the syllable but all of the consonants occur medially in the word.

/f/	['gaβɨ]	/gafɨ/	*'star'*
/s/	[a'sant^{h}]	/asad/	*'storm wind'*
/c/	['tcatcɪŋ]	/caciŋ/	*'drum'*
/x/	[a'k^{h}ai]	/axai/	*'pitpit'*
/b/	[ham'badʌ]	/habadə/	*'kunai'*
/d/	['bado]	/bado/	*'men married to sisters'*
/j/	['dzʊdzu]	/juju/	*'sleepy'*
/g/	['bagʌ]	/bagə/	*'sign'*
/m/	['k^{h}ʊmi]	/xumi/	*'cloud'*
/n/	['bane]	/bane/	*'in-law'*
/ɲ/	[gɨ'ɲamp^{h}]	/gɨɲab/	*'he is closing'*
/ŋ/	[nəŋ'amp^{h}]	/nəŋab/	*'he sees'*
/h/	[wə'hal̥ɨn]	/wəhal̥ɨn/	*'yellow'*
/l/	[a'lamp^{h}]	/alab/	*'he is shooting'*
/ʌ/	[a'ʌamp^{h}]	/aʌab/	*'tongue'*
/l̥/	[a'l̥aŋ]	/al̥aŋ/	*'possum sp.'*
/r/	[a'r̥aβʌ]	/arafə/	*'tree sp.'*
/w/	[a'wan]	/awan/	*'wing'*
/y/	['k^{h}ayaŋ]	/xayaŋ/	*'again'*

FINAL. All consonants except /h/, /w/, and /y/ occur finally in the syllable and word.

/f/	['dʊgʌɸ]	/dugəf/	*'afternoon'*
/s/	['aβɨs]	/afɨs/	*'grandmother'*
/c/	[batc]	/bac/	*'grandfather'*
/x/	[yɪk^{h}]	/ix/	*'down there'*
/b/	[mamp^{h}]	/mab/	*'tree'*
/d/	[ɸint^{h}]	/fid/	*'banana'*
/j/	[k^{h}aɲtc]	/xaj/	*'pig'*
/g/	[wʌŋk^{h}]	/wəg/	*'garden'*
/m/	[mam]	/mam/	*'brother'*
/n/	[nan]	/nan/	*'thing'*
/ɲ/	[haɲ]	/haɲ/	*'skin'*
/ŋ/	['wanaŋ]	/wanaŋ/	*'eel'*
/l/	[a'r̥ambʌɬ]	/arabəl/	*'they are going'*

/ʌ/	['naiwʌʌ]	/naiwəʌ/	*'wife's sister'*
/ɻ/	[goɻ]	/goɻ/	*'joint'*
/r/	[yau$\underline{ɾ}$]	/yaur/	*'bird'*

3.5.2. Clusters of Consonants

INITIAL. Only two consonant clusters occur initially in the word, /fr/ and /kɻ/. Neither of these consonant clusters can be posited as non-suspect for re-segmentation. The first cluster contains a flapped vibrant and so could be interpreted as either CC or CVC; the second comprises an aspirated stop followed by a retroflexed flapped lateral and could be interpreted as CC, CCC, CVC, or CCVC (see Section 3.2.1.).

[ɸə'ɾo]	/fro/	*'small'*
[k^{h}ɻiɲ]	/xɻiɲ/	*'of good appearance'*

MEDIAL. Consonant clusters do not occur medially in the syllable but a large number occur medially in the word. The first consonant of the cluster may be /b/, /g/, /m/, /n/, /ŋ/, /f/, /s/, /l/, /ɻ/, or /r/. The second consonant of the cluster may be /b/, /d/, /g/, /j/, /m/, /n/, /ŋ/, /f/, /s/, /w/, or /y/.

[ambə'namʌ]	/abnamə/	*'freely'*
[haŋgə'namp^{h}]	/hagnab/	*'he will speak'*
['amgʌ]	/amgə/	*'eye'*
['anəwʌl mə'hau]	/anwəl məhau/	*'two wives of one man'*
[aŋ'nɨs]	'aŋnɨs/	*'tree sp.'*
['aβsɪl]	/afsil/	*'child with grandmother'*
[wʊs'gain]	/usgain/	*'bird sp.'*
[ɸəl'bin]	/fəlbin/	*'I have pulled'*
[wʊɻə'me]	/uɻme/	*'place name'*
['aɾ^{ə}me]	/arme/	*'fly'*
[nəŋ'bin]	/nəŋbin/	*'I saw'*
['mamdu]	/mamdu/	*'thumb'*
['dzaŋdzoŋ]	/jaŋjoŋ/	*'bird sp.'*
[$\underline{ɾ}$əm'naɸ]	/rəmnaf/	*'some'*
[k^{h}anəŋ'oɲtc]	/xanŋoj/	'person's name'
['amɸel]	/amfel/	*'immediately'*
[k^{h}əβə'ya]	/xəfya/	*'rat'*

FINAL. Consonant clusters do not occur finally in the syllable or word.

3.5.3. Single Vowels

The vowels /i/, /e/, /a/, and /u/ can constitute a syllable by themselves.

[i'namp^{h}]	/inab/	*'it is burning'*
['au.e]	/aue/	*'you come* - imp.'
[a'l̥aβʌ]	/al̥afə/	*'tree sp.'*
[u'maŋgʌ]	/umagə/	*'hair'*

INITIAL. /i/, /e/, /a/, /o/, and /u/ occur initially in the syllable. /i/, /e/, /ə/, and /u/ occur initially in the word.

MEDIAL. All vowels can occur medially in the syllable and word.

FINAL. All vowels can occur finally in the syllable and word.

3.5.4. Clusters of Vowels

Only /a/ followed by /i/ or /u/ occur as the nucleus of a single syllable. Both /ai/ and /au/ can occur initially, medially, and finally in the syllable and word. The following deals with clusters other than /ai/ and /au/.

INITIAL. Clusters which occur word initially are /aiu/, /aiə/, /aui/, /aue/, /aua/, /auu/, /auə/.

MEDIAL. Clusters which occur word medially are /ia/, /iə/, /ui/, /ua/, /uu/, /uə/, /aia/, /aiə/, /aui/, /aue/, /aua/, /auu/.

FINAL. Clusters which occur word finally are /ie/, /ia/, /ou/, /ua/, /uə/, /aia/, /aiə/, /aui/, /aue/, /aua/, /auai/, /auaia/.

Initial	['ai.ʊnt^{h}]	/aiud/	*'story'*
	['ai.ʌn]	/aiən/	*'witch'*
	[au'i]	/aui/	*'here'*
	['au.e]	/aue/	*'you come* - imp.'
	[au.'amp^{h}]	/auab/	*'he is coming'*
	['au.ʊmp^{h}]	/auub/	*'he came'*
	['ɸau.ʌɸ]	/fauəf/	*'he struck'*
Medial	['gi.aŋ]	/giəŋ/	*'below'*
	['wi.ʌr]	/wiər/	*'mango'*
	['mu.im]	/muim/	*'you care for pigs'*
	[mu'amp^{h}]	/muab/	*'he cares for pigs'*
	['mu.ʊn]	/muun/	*'we care for pigs'*
	['l̥uʌl̥]	/l̥uəl̥/	*'horizontal timbers'*
	[wʊhai.'ambin]	/uhaiabin/	*'I am laughing'*
	['wai.ʌŋ]	/waiəŋ/	*'cassowary'*
	['lau.im]	/lauim/	*'you cook'*
	['lau.em]	/lauem/	*'cooking'*
	[dau.'amp^{h}]	/dauab/	*'he is bringing'*
	['dau.ʊmp^{h}]	/dauub/	*'he brought'*

Final	['kʰi.e lʌΦ]	/xie ləf/	*'hungry'*
	['kʰi.a]	/xia/	*'tree sp.'*
	['mo.u]	/mou/	*'thus'*
	[Φu.'a]	/fua/	*'he blew'*
	['ɣ̲u.ʌ]	/ruə/	*'day after tomorrow'*
	[wʊ'hai.a]	/uhaia/	*'he laughed'*
	['ai.ʌ gʌΦ]	/aiə gəf/	*'he was amazed'*
	['hau.i]	/haui/	*'tree sp.'*
	['dau.e]	/daue/	*'you bring* - imp.'
	[ɣ̲au.'a]	/raua/	*'he bought'*
	['kʰau.ai]	/xauai/	*'tree sp.'*
	[dau'ai.a]	/dauaia/	*'he was bringing'*

3.6. *A FEW COMMENTS ON THE HIGHER LEVELS*

The following remarks are very tentative. More investigation needs to be carried out on the higher levels of the phonological hierarchy.

3.6.1. The Phonological Word

The phonological word is composed of one to five syllables. It is a rhythm unit having one major stress placement, a composite of higher pitch and intensity. Consonant clusters and vowel clusters can occur across syllable boundaries within the phonological word. For non-suspect consonant vowel patterns for the phonological word with examples see Section 3.2.1.

3.6.1.1. *Juncture within the Phonological Word*

The premise 'Some segments may be nonsignificant transition sounds' (Pike 1947:62, premise 22) seems to be applicable to the non-phonemic transition sounds [ə] and [ɣ].

Where consonant clusters occur across syllable boundaries within the phonological word there is a tendency for a very short non-phonemic transitional schwa to occur between the two consonants.

	[nɛŋgə'namp^{h}]	/nəgnab/	*'he will see'*
Slow speech	['kxaɲtc 'naŋgɨ]	/kaj nagɨ/	*'pig rope'*
Normal speech	[kxaɲdzə'naŋgɨ]	/kaj nagɨ/	*'pig rope'*
	[yɪ'haɭəgaməɲɪmbi]	/ihaɭ gamɨŋ nibi/	*'a woman from Ihal'*

But there is usually close transition between the two consonants of a cluster where the first consonant of the cluster is /m/, /n/, /ŋ/, /f/, or /s/, and the second consonant is /b/, /d/, /j/, /g/, /f/, /s/, or /l/:

['amgʌ]	/amgə/	*'eye'*
[han'bin]	/hanbin/	*'I slept'*
[nəŋ'bin]	/nəŋbin/	*'I saw'*
['aβsɪl]	/afsil/	*'child with grandmother'*
[wʊs'gain]	/usgain/	*'bird sp.'*
['mamdu]	/mamdu/	*'thumb'*
['dzandzoŋ]	/jaŋjoŋ/	*'bird sp.'*
['amɸel]	/amfel/	*'immediately'*
[um'la]	/umla/	*'they died'*

There is a tendency for a short non-phonemic transitional velar fricative to occur between certain vowels occurring as a vowel cluster across syllable boundaries. This transitional sound fluctuates with its absence.

['dzɪɣʌɸ]	/jiəf/	*'decayed'*
['dzɪʌɸ]		

In normal speech phonological word-medial sounds tend to be voiced.

[aɾaβehonhan'aɾɨgun] /ara fe hon han arɨgun/ *'she went and after some time we ...'*

Slow speech ['bɨ 'ɾ̲unt^{h}] /bɨ rud/ *'white man'*
Normal speech ['b^{ə}ɾunt^{h}]

3.6.1.2. *Stress within the Phonological Word*

The premise which has been applied in this section is

> Segmental or suprasegmental elements which are predictable are nonphonemic; nonsymbolized elements are predictable when the reader can tell where they will occur by following a set of rules which tell him how to modify his pronunciation of symbolized contrastive items. (Pike 1947:62, premise 1)

Although the rules for the placement of stress cannot be stated comprehensively at this stage, it appears that stress is not phonemic. In phonological words of more than one syllable stress normally falls on the penultimate syllable.

['bado]	/bado/	*'men married to sisters'*
[a'l̥aβʌ]	/al̥afə/	*'tree sp.'*
['mandzʌ]	/majə/	*'big'*
[dau'ambʌl]	/dauabəl/	*'they are bringing'*
[dauaŋgə'nambʌl]	/dauagnabəl/	*'they will not bring'*
[dau'aŋgənamp^{h}]	/dauagnab/	*'he will not bring'*

In the third person singular of the present tense stress falls on the final syllable.

[a'ɾamp^{h}]	/arab/	*'he is going'*

3.6.2. The Phonological Phrase

3.6.2.1. *The Structure of the Phonological Phrase*

The phonological phrase consists of one or more phonological words and is potentially bounded by pause.

3.6.2.2. *Juncture within the Phonological Phrase*

There is a tendency for voiceless allophones to occur phrase finally and voiced allophones to occur phrase medially.

Slow [ˈsɪsɪmpʰ aɲˈdzeia] /sisib ajeia/ *'it was flying around'*
Normal [ˈsɪsɪmb aɲˈdzeia]

Elision tends to take place where a word beginning with a vowel follows a word ending with a vowel.

Slow [ˈkʰa ˈasɨ məˈneia] /xa asɨ mədeia/ *'he was sitting in the*
Normal [ˈkʰasɨ məˈneia] *place'*

A word final velar nasal may be lost before an alveolar nasal.

Slow [yɪˈhaɻ gamɨŋ ˈnɪmbi ap auˈa] /ihaɻ gamɨŋ nibi af aua/
Normal [yɪˈhaɻ gamɨnɪmbiaβauˈa] *'a woman from Ihal came'*

A word initial pharyngeal fricative may be lost following as aspirated stop.

Slow [ˈɣ̲am antʰ ˈhanʌm] /ram ad hanəm/ *'sleeping at my house'*
Normal [ˈɣ̲amantʰˈanʌm]

For further examples see Appendix A.

3.6.3. The Phonological Sentence

The phonological sentence is composed of phonological phrases and is the unit of intonation placement in the phonological hierarchy. It is bounded by pause, and is characterised by an undulating intonation contour and a down-glide on the final syllable. For examples see Appendix A.

4. THE IMPORTANCE OF NATIVE SPEAKER REACTION IN THE DESIGN OF A WRITING SYSTEM

In this paper I have taken the position that the phoneme exists as a psychologically real unit within the mind of the native speaker. The significance of this premise in linguistic theory was discussed in Section 2. It is a basic premise of Pike's model upon which the segmental analysis in Section 3 is based. In this section I want to focus again upon the psychological reality of the phoneme and to discuss the application of the premise in two areas: the phonological analysis, and the design of a writing system based on that analysis. Native

speaker reaction to linguistic materials provides data for the phonological analysis, and may corroborate the validity of the analysis or give insights into problem areas. Examples were given in Section 2 from Sapir (1933), Shand (1972) and Gudschinsky (1973). Further observations and experiments of a psycholinguistic nature which proved helpful in the segmental analysis of Kobon presented in Section 3 are discussed in Section 4.1. Native speaker reaction can also be of help in the design of a writing system for a language. In Section 4.2. this is discussed further together with some experiments of a psycholinguistic or sociolinguistic nature which I made as part of my attempt to design a suitable writing system for Kobon. The results of the tests discussed in Sections 4.1. and 4.2. and the implications as regards the design of a writing system for Kobon are incorporated in the discussion of certain aspects of the proposed writing system in Section 4.3.

4.1. *PSYCHOLINGUISTIC TESTS*

Native reaction has been used throughout this analysis as part of the data upon which the analysis is based - "For some time I have insisted on the fact that explicit observable reactions of speakers to linguistic material are part of the data which must be analysed as essential to the founding of an adequate phonemic theory and procedure" (Pike 1967:352). Some of these "explicit observable reactions" have been spontaneous, e.g. when I said **Adam** and my language assistant repeated it as ['andam]. During the course of my fieldwork, Kobon speakers have in such ways unwittingly provided me with insights into the emic phonological system of their language. Their pronunciations of foreign words revealed aspects of the psychologically real phonological system which was causing the modification of the etic shape of the foreign words. If it is true that "a phonemic orthography is the easiest one for the native to learn to read and write" (Pike 1947b:61, premise 1), then the pronunciation of foreign words will show, at one and the same time, aspects of the speaker's emic phonological system and the writing system for his language which will be easiest for him to learn to read. Encouraged by the insights afforded by these spontaneous and unelicited utterances of foreign words, I decided to elicit some utterances in an endeavour to obtain the intuitive judgments of the native speaker. An example is the list of Neo-Melanesian words in Appendix B. Aig, from whom the words were obtained, knows some Neo-Melanesian words but is by no means fluent in the language. I recorded his repetitions when prompted with Neo-Melanesian words. The modification of the Neo-Melanesian words according to the grid of his own

phonemic system revealed a great deal about that system. His repetition, for example, of Neo-Melanesian [klos] *'clothes'* as [k^{hə}'los], [spun] *'spoon'* as [sɪ'βʊn] and ['askim] *'ask'* as ['as^{ə}kim] shows a tendency to separate consonant clusters with non-phonemic transitional vowels. He equated the second [b] of Neo-Melanesian [bosboi] *'foreman'* with /b/ and repeated the word as ['bos^{ə}mbe]. He inserted a schwa to break up the consonant cluster and articulated the medial /b/ with a preceding homorganic nasal. On the other hand he equated the [b] in ['trabel] *'trouble'* with Kobon /f/ which would be manifested word medially as [v][ʋ] or [β]. Accordingly he repeated the word as [tca'βo!]. He equated the initial cluster [tr] in ['trabel] with Kobon /c/ which is manifested initially as [tc], rather than as a sequence, since there are very few initial consonant clusters in Kobon and [tr] is not one of them. A close phonetic equivalent in Kobon to the initial cluster in ['trabel] would be [d^{ə}ɾ]. But the initial segment in ['trabel] is voiceless and [tr] is more easily equated with [tc] than [d^{ə}ɾ]. Had the initial segment been voiced he would have equated the sequence [dr] with a sequence of two phonemes, /d/ followed by /r/ as in ['driman] *'dream'*, which he repeated as [d^{ə}'ɾiman]/[t^{ə}'ɾiman].

Since it was not important that the sounds being examined be contained in real words, I made up possible but non-existent words containing the sounds I wanted to hear repeated. I prompted the language assistant with the made-up words and recorded his first repetition in each case. One particular area of interest which I was investigating was whether the medial and final sequences of obstruent preceded by homorganic nasal were just one emic unit or two. Although the test was conducted with just two language assistants, Lipgi and Urumungu, the consistency with which they inserted a homorganic nasal in the made-up words which had a voiced obstruent word medially but no homorganic nasal, suggested that for them the sequence was just one emic unit.

As mentioned in Section 2, I used possible but non-existent Kobon words to test whether my language assistants heard the difference between voiced and voiceless obstruent sounds in various positions of the word. The results shows that the distinction between [tc] and [dz] was heard initially but not medially, suggesting that while voicing was the phonetic distinction between /c/ and /j/ initially, medially it was the presence of the preceding homorganic nasal which was the distinction rather than voicing. This was confirmed later when it was found that /c/ has an allophone [dz] which fluctuates with [tc] word medially.

Sapir (1933), Shand (1972) and Gudschinsky (1973) all took native speaker's spelling as evidence for his emic phonological system (see Section 2). Here again, since the optimum writing system from the point

of view of ease of learning is based upon the emic phonological system, the insights afforded by the native speaker's spelling are relevant to both the phonological analysis and the writing system based upon it.

The spelling test referred to in Section 3.2.3.4. was also designed to elicit the intuitive judgment of the native speaker. Over a period of about two weeks I taught my language assistant, Urumungu, who was illiterate, to read a few orthographic symbols, including **n**, **d**, and **a**. I gave him some practice in joining these units together into syllables. I then asked him to arrange letter cards so as to make [**an'dan**] *'path'*. He spelled it **adan**, confirming that for him the sequence [**nd**] in the word [**an'dan**] **/adan/** *'path'* was just one unit psychologically, one phoneme **/d/**. An experiment conducted by Gudschinsky (1973) in which a native speaker arranged letter cards confirmed that psychologically he equated the phonetic sequence [**wa**] which occurred word finally with the [**t**] which occurred word initially and medially. (See Section 2).

4.2. *SOCIOLINGUISTIC TESTS*

One of the goals of the phonological analysis was to arrive at a writing system for the Kobon language. Orthographical representation is not directly related to phonological studies but it has been included here for two reasons: firstly, many of the criteria upon which the choice of a writing system is based have sociolinguistic implications, and secondly, the sort of testing which needs to be done to ensure that the orthography will be acceptable to the community can also give insights into the phonological structure of the language.

Smalley (1964:34) lists the criteria for an adequate writing system in order of importance as:

1. Maximum motivation for the learner ... usually the learner wants most what is considered standard in the area.
2. Maximum representation of speech. The fullest, most adequate representation of the actual spoken language is, by and large, the ideal.
3. Maximum ease of learning.
4. Maximum transfer. Here we refer to the fact that certain of the alphabet or other written symbols will, when learned, be applicable to the more rapid learning of the trade or colonial languages in the area. Thus, if a new learner learns a certain pronunciation of a certain symbol in his own native language, and if he can use that same pronunciation with the same symbol in the trade or national language, this is a case of transfer. If, however, the same symbol is used with different value in the other writing system, that transfer cannot be made.

5. Maximum ease of reproduction. Typing and printing facilities are a consideration, although they are not of first importance.

As far as 2 and 3 are concerned they will be satisfied by a phonemic orthography. "A phonemic orthography is the easiest one for the native to learn to read and write" (Pike 1967:61, premise 1). The principle which underlies a phonemic orthography is that every phoneme is represented by one and only one symbol. But this principle needs to be applied with some flexibility because of the need to satisfy other criteria. In order to facilitate transfer to literacy in a trade language, orthographical symbolisation which corresponds to that of the trade language may need to be used even though it may not be the best to meet criteria 2 and 3. It may be that criteria 2 and 3 will have to give way to considerations of what typewriter symbols are readily available. The government of the country may not want an orthography with unusual symbols, which may mean using a digraph rather than a single modified symbol. It may be that the strictly phonemic orthography will have to give way to the orthography which the learner wants, and which will therefore provide maximum motivation in learning and more likely acceptance by the community.

Writing tests and preference tests were made to help find the symbols which would best meet the first criterion, and reading tests were made to help find the symbols which would best meet the third criterion as far as persons already literate in New Guinea Pidgin (N.G.P.) or English are concerned.

If it is true that "a phonemic orthography is the easiest one for the native to learn to read and write" then it should also be true that the orthography which the formerly illiterate native speaker finds easiest to read and write represents the phonemic system of his language most accurately. It should be possible to use experiments based on reading and writing as part of the evidence for the phonemic analysis. In reading, the signal is entirely visual but presumably results in the matching of the visual code with mental units, psychologically real phonemes, as in oral communication. One would expect that the closer the correspondence between mental unit and written symbol, the easier and quicker would be the process of learning to read. The ease with which people read using the supposedly phonemic orthography should be confirmation that it is based on a correct analysis. Trouble spots for the new reader may highlight areas of incorrect analysis. As mentioned in Section 2, students' reading problems in literacy classes were part of the evidence which led Shand (1972) to suspect that his phonological analysis was inaccurate in certain respects.

In the reading tests conducted during the course of this analysis the subject was given a written word and asked to read it. His response

and the time elapsing between his seeing the word and responding were recorded. In the writing tests the subject was asked to write words which were dictated to him. The reading and writing tests were conducted with six Kobon young men, Jepi, Lipgi, Ugai, Kobi, Mapan and Kenneth. Kenneth was literate in English and the other five young men in New Guinea Pidgin (N.G.P.) care had to be taken in the use of these results because of the influence upon the subject of the phonemic system of the language in which he was already literate. Nevertheless the results of the tests gave useful information as to which symbols best met criteria 2, 3 and 4. As for criterion 4, maximum transfer, the results of the test were valuable just because the subject were influenced by the phonemic system of N.G.P. or English, since any orthography for Kobon must take into account and as far as possible provide for maximum transfer into these languages. Thus the results of the tests showed areas where it might be desirable to depart from a strictly phonemic orthography to facilitate transfer (see example, Section 4.3.1.).

The test which was most useful in showing which orthographical symbols would best meet criterion 1 was the preference test. The subject was presented with a number of alternative ways of writing a word and asked which he preferred and his reasons for his preference. This test was carried out with three young men, Lipgi and Ugai, who are literate in N.G.P. and Kenneth, who is literate in English.

The results of the tests are incorporated in Section 4.3.

4.3. A suggested orthography incorporating the results of the tests.[1] In my work on the design of a writing system for Kobon I have followed closely the criteria suggested by Smalley (1964), which were summarised and discussed in Section 4.2. In deciding whether or not these criteria were met in the writing system as a whole or in the representation of a particular phoneme by a particular orthographical symbol, I attached considerable weight to the results of the tests just described in Sections 4.1. and 4.2. This section contains a discussion of the criteria which were relevant to the choice of orthographic symbols to represent the phonemes. I have tried to focus on problem areas which are of special interest, particularly as regards the insights afforded by the intuitive judgments of the native speaker, as elicited by the tests.

The proposed orthographical symbols for the segmental phonemes can be seen in Chart 10. Of the nineteen consonant phonemes, thirteen are

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[1] An orthography was proposed by Marcus and May Dawson (1969 and 1970), formerly working with SIL.

represented by one orthographic symbol which represents only that phoneme. /ŋ/ is represented by a digraph ng. The symbol n represents both /n/ and /ɲ/ with the addition of a diacritic in the case of the latter. The same symbol l represents /l/, /ʎ/ and /l̩/. Of the seven vowel phonemes, three are represented by one orthographic symbol which represents only that phoneme. The same symbol o represents both /o/ and /ə/ with the addition of a diacritic in the case of /ə/. The same symbol u represents both /u/ and /ɨ/ with the addition of a diacritic in the case of /ɨ/.

CHART 10

SUGGESTED ORTHOGRAPHY FOR KOBON

PHONEME	ALLOPHONES			SUGGESTED ORTHOGRAPHY
	Word Initial	Medial	Final	
/f/	[ɸ][f]	[β][ѵ][ѵ][ɸ]	[ɸ][p][p^h]	p P
/s/	[s]	[s]	[s]	s S
/c/	[tc]	[tc][dz]	[tc]	c C
/x/	[k^h][kx][x]	[k^h][kx][x][ɣ]	[k^h][kx][x]	k K
/b/	[b][p]	[mb][b]	[mp^h]	b B
/d/	[d]	[nd][d]	[nt^h][t^h]	d D
/j/	[dz]	[ɲdz][dz]	[ɲtc]	j J
/g/	[g][k]	[ŋg][g][ɣ]	[ŋk^h]	g G
/m/	[m]	[m]	[m]	m M
/n/	[n]	[n]	[n]	n N
/ɲ/	[ɲ]	[ɲ]	[ɲ]	ñ Ñ
/ŋ/		[ŋ]	[ŋ]	ng Ng
/h/	[h]	[h]		h H
/l/	[l]	[l]	[l][ɬ]	l L
/ʎ/	[ʎ]	[ʎ]	[ʎ]	l L
/l̩/	[l̩]	[l̩]	[l̩][l̩][ɭ]	l L
/r/	[ɾ̲]	[ɾ][r]	[ɾ][r̲][ɾ̲][r̲]	r R
/w/	[w]	[w]		w W
/y/	[y]	[y]		y Y
/i/	[i][yɪ]	[i][ɪ]	[i][ɪ]	i I
/e/	[e̞]	[e̞]	[e̞]	e E
/a/	[a]	[a]	[a]	a A
/o/	[o̞]	[o̞]	[o̞]	o O
/u/	[u][wʊ][ʍʊ]	[u][wʊ][ʊ][uɪ]	[u]	u U
/ɨ/		[ɨ][ɯ]	[ɨ][ɯ]	ü Ü
/ə/		[ʌ][ə][ɐ]	[ʌ][ə]	ö Ö

4.3.1. It is proposed that the lenis obstruent phonemes /b/, /d/, /j/, and /g/ be written as b, d, j, and g in all positions in the word.[1] It is arguable that the prenasalisation of the obstruents should be represented in the orthography. Word inially there is usually no perceptible prenasalisation, word finally there almost always is, and word medially there almost always is unless there is a nasal or a lenis obstruent phoneme earlier in the word.

The prestige language is N.G.P. in which clusters of /m/ + /b/, /n/ + /d/ and /ŋ/ + /g/ occur word medially but not word finally. Borrowed words having word final consonant clusters drop the final consonant, e.g., island becomes [ailan]. Clusters of /n/ + /j/ do not occur in N.G.P. A sequence of /n/ + /j/ in borrowed words becomes /n/ + /s/ in N.G.P. so that, e.g., engine becomes [ensin]. Thus Kobons who can read and write N.G.P. become familiar with the sequence of nasal phoneme followed by stop phoneme and may begin to hear the prenasalised obstruents of Kobon as a sequence of nasal and stop. Thus when Kobons literate in N.G.P. were asked to write Kobon words containing word-medial or -final prenasalised obstruent phonemes, the prenasalisation on /b/ was written in 88% of the instances, and on /d/ and /j/ in 70%. However the prenasalisation on /g/ was written in only 28% of the instances. This suggests that the Kobon does not think of /g/ in his own language as a sequence of nasal followed by stop. The reason for this may be that both /ŋ/ and /ŋg/ are represented by ng in the orthography of N.G.P. It would seem best to follow this natural inclination or intuition of the Kobon and to write /g/ simply as g in all positions in the word, especially since tests show that the sequence ngg causes difficulty to the reader, particularly word finally, whilst g is read in all positions in the word with ease. But even if /g/ is written g the question remains whether the prenasalisation on /b/, /d/, and /j/ should be written word finally and where it occurs word medially. This would be inefficient from the linguistic point of view, since the phonemes /b/, /d/, and /j/ would be represented differently in different positions of the word, that is by a single symbol word initially and by a digraph word finally; word medially representation would be either by a single symbol or a digraph depending upon the presence or absence of audible prenasalisation. This inconsistency would cause difficulty to the learner, especially since Kobon has /m/ and /n/ (and also /ŋ/) which are represented in the orthography by m and n (and by ng). Clusters of /N/ + /C/ and /C/ + /N/ occur word medially but not word initially or finally. In /N/ + /C/

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[1] Dawson and Dawson (1969) propose that the lenis obstruent phonemes be written initially as b, d, j and g, and medially and finally as mb, nd, nj and ngg. This is because they are analysed as nasal phoneme followed by stop phoneme in that paper.

sequences, /N/ may be /m/, /n/, or /ŋ/ and /C/ may be /b/, /d/, or /g/. However such sequences are not common. The presence or absence of open transition between the consonants forming the cluster determines whether or not the /b/, /d/, and /g/ have audible prenasalisation, e.g., /amgə/ *'eye'* is pronounced either as ['amgʌ] or ['aməŋgʌ] and /mamdu/ *'thumb'* as either ['mamdu] or ['mamənd̥u]. Since the schwa is transitional and non-phonemic it should not be represented in the orthography and these words would be written either as **amgö** and **mamdu** or as **amnggö** and **mamndu**. The former would be easier for the learner.

Though there would be some sacrifice of efficiency and consistency of representation if the audible prenasalisation on /b/, /d/, and /j/ were to be written, and though learning would be made somewhat more difficult, the primary consideration is felt to be the acceptance of the orthography by the Kobon people.

Smalley considers the most important consideration in a practical orthography to be that the writing system be adapted ... "as much as possible to the cultural trends, to the prestige, education, and political goals which are likely to win out" (1964:36). He writes that the primary concern in adapting a writing system must be "maximum motivation for the learner, and acceptance by his society and controlling groups ... usually the learner wants most what is considered standard in the area" (1964:34). Smalley points out that by learning to read and write the trade language, people learn to hear distinctions between allophones in their own language, even though the distinctions are not phonemically significant.

> There are cases in which nonphonemic distinctions have to be written simply because the trade language makes a phonemic distinction between them. ... To make this concession would be extremely important. It is important because of the attitude of the prestige-laden bilingual group which can read the trade language. If, however, extensive experimentation without writing the difference shows no such reaction on the part of this group, the missionary would be wise not to raise the issue himself. (1964:50).

Reading tests show that writing those occurrences of /b/, /d/, /j/, and /g/ which manifest audible prenasalisation as **mb**, **nd**, **nj**, and **ngg** makes no significant difference to the speed of reading compared with writing them **b**, **d**, **j**, and **g**. But in the case of /b/ and /d/ tests showed a loss of accuracy when prenasalisation was not written, no doubt because the symbols **b** and **d** were being read within the phonemic framework of N.G.P. or English. This is predictable when a person literate in a language other than his mother tongue first attempts to write his own language. In the case of /j/, there was no loss of accuracy when prenasalisation was not written, presumably because **j** is only used word initially in N.G.P. and English. Borrowed words containing medial or

final /j/ are spelled with s in N.G.P. and in English medial and final /j/ is usually spelled with g, ge or dge. Thus there is much less likelihood that a medial or final j will be read without prenasalisation. The Kobon literate in N.G.P. or English has not encountered the symbol j word medially or finally before, and so when he does so in his own language he automatically pronounces the prenasalisation. In the case of /g/ there was a loss of accuracy when audible prenasalisation was written, the reason probably being that in both N.G.P. and English the symbols ng are used to represent both /ŋ/ and /ŋg/ word medially, e.g., N.G.P. bringim /briŋim/ *'bring'* and pinga /piŋga/ *'finger'* and English *'singer'* /siŋə/ and *'finger'* /fiŋgə/. When confronted by the sequence ngg in his own language the Kobon finds the ng familiar but does not know whether to read it as /ŋ/ or /ŋg/. The fact that ng is followed by g without an intermediate vowel should provide the clue to read ng as /ŋ/, but tests show that in some cases when confronted by ngg the reader interprets the ng as /ŋg/ and makes an extra syllable to accomodate the additional g, e.g., hangg /hag/ *'cucumber'* read as [haŋ'gaŋk^{h}]. In other cases, the ng having been read as /ŋg/, the following incongruous g was interpreted as a vowel, e.g., hangg /hag/ read as ['haŋgə] and ['haŋge].

The results of the tests suggest that audible prenasalisation might need to be written in the case of /b/, /d/, and /j/ but should probably not be written in the case of /g/. But since there are advantages in not writing prenasalisation, that is linguistic efficiency and easier learning, it is felt that trial materials should be produced in which prenasalisation is not written for any of the lenis obstruent phonemes. If there is a reaction on the part of the bilingual group, then prenasalisation must be written.

4.3.2. It is suggested that /ɲ/ be represented by ñ.[1]

1. There would be no transference value either from a second language to vernacular or vice versa by using ny. This orthographic sequence only occurs morpheme finally in English and represents /n/ + /i/ and is pronounced [ni] or [nɪ] as, e.g., any /eni/. Reading tests show that when a final /ɲ/ in a Kobon word is written ny a person literate in N.G.P. or English reads it as a sequence of consonant followed by vowel, the vowel usually being [i]. The orthographic sequence ny does not occur in N.G.P. There is a palatal nasal in the Madang dialect of N.G.P. and in British and Australian English, but in each case this is

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[1]Dawson and Dawson (1969) suggest that /n/ be represented by ny as this would provide maximum transference value for the prospective reader of N.G.P. or English, and as there is no sequence of /n/ followed by /y/ in Kobon there would be no possibility of ny being read as such.

an allophone of /n/ occurring before /u/. In N.G.P. /n/ is written ni in this position, e.g., nius /nus/ *'news'*, and in English the sequence palatal consonant followed by /u/ is usually written either as C + ew as, e.g., in new /nu/ or as C + ui as, e.g., in nuisance /nusens/.
2. A single symbol would be easier for the learner than a digraph, especially since each symbol of the suggested digraph, ny, represents another phoneme in Kobon.
3. In reading tests the sequence ny was very seldom read correctly by persons literate in N.G.P. or English. On the other hand they tended to read ñ as an alveolar nasal, but usually adjusted it to the alveopalatal because of the context. In writing tests Kobons literate in N.G.P. or English almost always represented /ɲ/ by a simple n, showing that they associated /ɲ/ most closely with /n/. In preference tests the written sequence ny was reacted against because of the presence of the y, but the tilde on the ñ was received favourably.
4. The symbol ñ has been used successfully in other languages in Papua New Guinea. The typewriter symbol is easily obtainable.
5. /ɲ/ carries a low functional load - 0.799% in a sampling of text processed by the computer at the University of Oklahoma. Thus the basic similarity of ñ to n is to be welcomed, since it would not be of any great consequence if the tilde were to be left off the alveopalatal nasal in writing. Words differentiated only by an alveopalatal as opposed to an alveolar nasal are few, and in these cases the context would identify the correct phoneme.

4.3.3. It is suggested that /ʎ/ be represented by l.[1]
1. As with ny there would be no transference value either from a second language to the vernacular or vice versa in using ly. With few exceptions the written sequence ly only occurs morpheme finally in English and represents /l/ followed by /i/ or /ai/ as, e.g., in loosely /lusli/ and ally /alai/. In N.G.P. there is neither a palatal lateral phoneme nor the orthographic sequence ly. Thus the Kobon literate in his own language wanting to learn to read N.G.P. will not be at any advantage because he has learnt to read ly as /ʎ/ for he will not find that sequence in N.G.P. When he comes to read English he will be confused when he reads the word final sequence ly as an alveopalatal lateral.
2. A single symbol would be easier for the learner than a digraph, especially since each symbol of the suggested digraph, ly, represents another phoneme in Kobon.

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[1]Dawson and Dawson (1969) suggest that /ʎ/ be represented by ly as this would provide the maximum transference value for the prospective reader of N.G.P. and English, and as there is no sequence /l/ + /y/ in Kobon there would be no possibility of ly being read as such.

3. In writing tests /ʎ/ was almost always represented by the simple l, confirming that /ʎ/ is associated most closely with /l/. In preference tests the written sequence ly was reacted against because of the presence of the y and the simple l was preferred.
4. /ʎ/ carries a very low functional loan - 0.182%. To represent both /l/ and /ʎ/ by l would not cause undue confusion to the learner.

4.3.4. It is proposed that /ɭ/, be represented by l in common with /l/ and /ʎ/.[1]
1. A single symbol would be easier for the learner than a digraph.
2. /ɭ/ carries a low functional loan - 0.714%. Though the learner's task would be made more complicated by representing three phonemes /l/, /ʎ/, and /ɭ/ with the same symbol l, this disadvantage would be out-weighed by the advantage of a single symbol which is completely acceptable to the bilingual group. An alternative would be to modify the l in some way, or to use t for the retroflexed lateral, but in view of the low functional load of these phonemes it would not be wise to risk a reaction against the writing system in the future as people become more sophisticated in the culture patterns around them (1964:37).

4.3.5. It is suggested that /c/ be represented by c.[2]
Though the use of ch would be of transference value for the Kobon literate going on to read English, this advantage would be out-weighed by the disadvantages of inefficient representation and complication of the learning process occasioned by the use of a digraph. In writing tests c was used for 40% and j for 60% of occurrences of /c/. Reading tests showed that the initial tendency to read c as [k^h] was quickly overcome, and when j was used to symbolise /c/ it was read as /j/ initially. Preference tests showed a preference for c initially and j medially and finally. If /c/ were represented by j and prenasalisation of /j/ were to be written, there would be a distinction between the writing of /c/ and the prenasalised allophones of /j/, but allophones of /j/ not having audible prenasalisation (occurring word initially and sometimes word medially) would not be differentiated from /c/. Therefore it is proposed that c be used in initial trial publications, and that if the bilingual group shows a strong preference for the use of j rather than c, then this should be followed.

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[1]Dawson and Dawson (1969) suggest that the retroflexed lateral phoneme be represented by lt as this digraph matches as closely as possible the way that equivalent sounds are symbolised in N.G.P. and English.

[2]Dawson and Dawson (1969) suggest that /c/ be represented by ch since the Kobon pronunciation of that phoneme is almost identical with ch in church.

4.3.6. It is proposed that /f/ be represented by p.[1]
The most commonly occurring allophones of /f/ in Kobon are the bilabial fricatives [Φ] and [β]. In N.G.P. [Φ] occurs frequently and is sometimes represented by p, so the use of p in Kobon will have transference value to N.G.P.

4.3.7. It is proposed that /ɨ/ be represented by ü.[2]
1. Tests show that /ɨ/ is equated more closely with /u/ than with any other vowel.
2. The symbol ü is readily available.
3. The sequence ee would be misleading for a person literate in English, who would tend to pronounce it [i].
4. A single symbol would be easier to learn than a digraph.

4.3.8. It is proposed that /ə/ be represented by ö.[3]
1. Tests show that /ə/ is equated more closely with /o/ than with any other vowel.
2. The phoneme represented by o is the least frequently occurring vowel - 0.975%.
3. A single symbol would be easier to learn than a digraph.
4. The symbol ö is readily available.
5. The sequence oo would be misleading for the English literate, who would tend to pronounce it [u].

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[1]Dawson and Dawson (1969) suggests that /f/ be represented by f.

[2]Dawson and Dawson (1969) suggest that /ɨ/ be represented by ɨ. Subsequently the Dawsons (in verbal communication 1972) suggested ee instead.

[3]Dawson and Dawson (1969) suggest that /ə/ be represented by ɛ. Subsequently the Dawsons (in verbal communication 1972) suggested oo instead.

APPENDIX A
SAMPLE TEXT

The following sample text is written phonetically (1), phonemically (2), with the suggested orthography (3), with morpheme-by-morpheme translation (4), and with free translation (5).

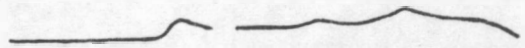
YAULA'S STORY OF HIS VISIT TO IHAL

1. yánt^{h} Φen yauḷʌmánʌhaŋgənámbin // nʌndánəmp^{h} yɪháḷəgaməndmbiaβauá //
2. yad fen yauḷə manə hagnabin. nəd anəb ihaḷ gamɨŋ nibi af aua.
3. Yad pen Yaula manö hagnabin. Nöd anöb Ihal gamüng nlbi ap aua.
4. *I Yaula talk speak.will.I. before Ihal below woman a came.she*
5. *I, Yaula, will speak. Some time ago a woman came from down at Ihal.*

1. aΦ aΦ aΦřámant^{h}ánʌmΦehaŋga / k^{h}ʌlmaɲaβámiməkxaɲdzənáŋgɨΦamimdáumimagʌmařá //
2. af af af ram ad hanəm fe haga, xəl maɲu af amim xaj nagɨ famim daumim e gəm ara.
3. Ap ap ap ram ad hanöm pe haga, 'Köl mañu ap amlm kaj nagü pamlm daumlm' e göm ara.
4. *coming house my sleeping said.she you time a come pig rope make bring saying went.she*
5. *She came and slept at my house and said, 'Sometime you must come and bring some pig rope', and she left.*

1.ařaβehonhanářɨgunřóliΦen haŋgənóŋk^{h}ámɨŋnʌŋgunářno //
2. ara fe hon han arɨgun rol i fen hagno xamɨŋ nəf e gun arno.
3. Ara pe hon han arügun rol i pen hagno, 'Kamüng nöp' e gun arno.
4. *Went.she we sleep left yesterday this said.we alive saying went.we*
5. *She went and after some time we talked and thinking her to be alive we went.*

1. amemdúsɪnlaŋnəŋnóΦen yɪhaḷgámɨŋnɪmbiɣ̲ɨmnaβáusɪxməndéiladúsɪnlaŋ /
2. amem dusin laŋ nəŋno fen ɬhaḷ gamɨŋ nibi rɨmnaf haus six mədeila dusin laŋ.
3. Amem Dusin lang nöngno pen ɬhal gamüng nibi rümnap haus sik mödeila Dusin lang.
4. *Coming Dusin up saw.we Ihal below women some house sick were Dusin up*
5. *Arriving at Dusin we saw that there were some Ihal women at the clinic there.*



1. xalehaŋgəlawásʌ nɪmbiánəmbúmʌmbegɨla //
2. xale hagla wasə nibi anəbu uməb e gɨla.
3. Kale hagla, 'Wasö, nibi anöbu umöb' e güla.
4. *They said no woman that died.she said.they*
5. *They said, 'No, that woman has died.'*

APPENDIX B

NEW GUINEA PIDGIN WORDS AS PRONOUNCED BY A KOBON, AIG

Orthography	Normal pronunciation	Aig's pronunciation	Gloss
plang	[plaŋ]	[Φə'ɾaŋ]	*'plank'*
slip	[slip]	[s^{ə}'ɾip]	*'sleep'*
stua	[stua]	[s^{ə}'ɾua]	*'store'*
katres	['katres]	['k^{h}at^{ə}ɾes]	*'cartridge'*
bensin	['bensin]	['beŋdzɪn]	*'benzine'*
bisket	['bɪsket]	['bɪs^{ə}ger]	*'biscuit'*
brata	['brata]	[b^{ə}'ɾada]	*'brother'*
tu dola	[tu 'dola]	['tʊn 'dola]	*'two dollars'*
dring	[drɪŋ]	['tɪɾɪŋ]	*'drink'*
gris	[gris]	[gə'lis]	*'grease'*
handel	['handel]	['hander]	*'handle'*
Japan	['d^{y}apan]	['dzaβan]	*'Japan'*
kalabus	['kalabus]	['k^{h}aɾambɨs]	*'prison'*
rot	[rot]	[lor]	*'road'*
klaut	[klaut]	[k^{h}ə'laut]	*'cloud'*
pilai	['pilai]	['Φɪlai]	*'play'*
baket	['baket]	['baɣet]['bak^{h}et]	*'bucket'*
aipas	['aipas]	['aiΦas]	*'blind'*
abus	['abus]	['aβʊs]	*'meat'*
tumora	[tu'moɾa]	[tʊ'maɾa]	*'tomorrow'*
asde	['asde]	['as^{ə}de]['as^{ə}te]	*'yesterday'*
askim	['askɪm]	['as^{ə}kim]	*'ask'*
Australia	[aus'trelia]	[aus^{ə}'lelia]	*'Australia'*
lotu	['lotu]	['lo$_{̩}$lu]	*'church'*
luluai	['luluai]	[$_{̩}$lu$_{̩}$lu'ai]	*'local government official'*

Orthography	Normal pronunciation	Aig's pronunciation	Gloss
tudak	['tudak]	['tʊtak^{h}]	*'darkness'*
bris	[brɪs]	[ɸ^{ə}'ɾɪs]	*'bridge'*
buk	[buk]	[bukx]	*'book'*
brus	[brus]	[b^{ə}'ɾʊs][b^{ə}'lʊs]	*'tobacco'*
wan paun	[wan paun]	[wan ɸaun]	*'one pound'*
handet	['handet]	['hander]	*'hundred'*
driman	['driman]	[d^{ə}'ɾiman][t^{ə}'ɾiman]	*'dream'*
krai	[krai]	[gɪ'ɾai][ga'ɾai]	*'cry'*
graun	[graun]	[gɪ'ɾaun]	*'ground'*
ples	[ples]	[ɸ^{ə}'les]	*'place'*
blut	[blut]	[b^{ə}'lʊt^{h}]	*'blood'*
klas	[klas]	[k^{h}a'las][k^{h}a'ɾas]	*'class'*
klos	[klos]	[k^{hə}'los]	*'clothes'*
siot	[s^{i}ot]	[si'or]	*'shirt'*
hariap	['haɾiap]	[aɾi'ap]	*'hurry'*
lam	[iam]	[a'ɾam]	*'lamp'*
resa	['resa]	[a'ɾes]	*'razor'*
piaua	['plaua]	[f^{ə}'ɾaua]	*'flower'*
plet	[plet]	[ɸ^{ə}'leɾ]	*'plate'*
trabel	['trabel]	[tca'βoɻ][sa'βoɻ]	*'trouble'*
spet	[spet]	[sɪ'βet^{h}]	*'spit'*
spun	[spun]	[sɪ'βʊn]	*'spoon'*
swit mo	[swit mo]	[sɪ'βit^{h} mo]	*'very sweet'*
Trinde	['trinde]	[t^{ə}'ɾinde]	*'Wednesday'*
tripela	['tripela]	[t^{ə}'ɾiɸela]	*'three'*
kaikai	['kaikai]	['kxaikxai]	*'food'*
botol	['botol]	['boɾoɻ]	*'bottle'*
kapa	['kapa]	['k^{h}aua]	*'roofing iron'*
kiap	['kiap]	['k^{h}iaɸ]	*'patrol officer'*
nil	[nil]	[nɪl]	*'nail'*
hangre	['hangre]	['aŋgɾi]	*'hungry'*
bulmakau	['bulmakau]	[bʊl'maɣau]	*'cattle'*
bosboi	['bosboi]	['bos^{ə}mbe]	*'foreman'*
taro	['taɾo]	['ɾ̲aɾ̲oɣ]	*'taro'*
tultul	['tultul]	['ɾ̲uɾ̲ul]	*'local government official'*

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